FIG. 1

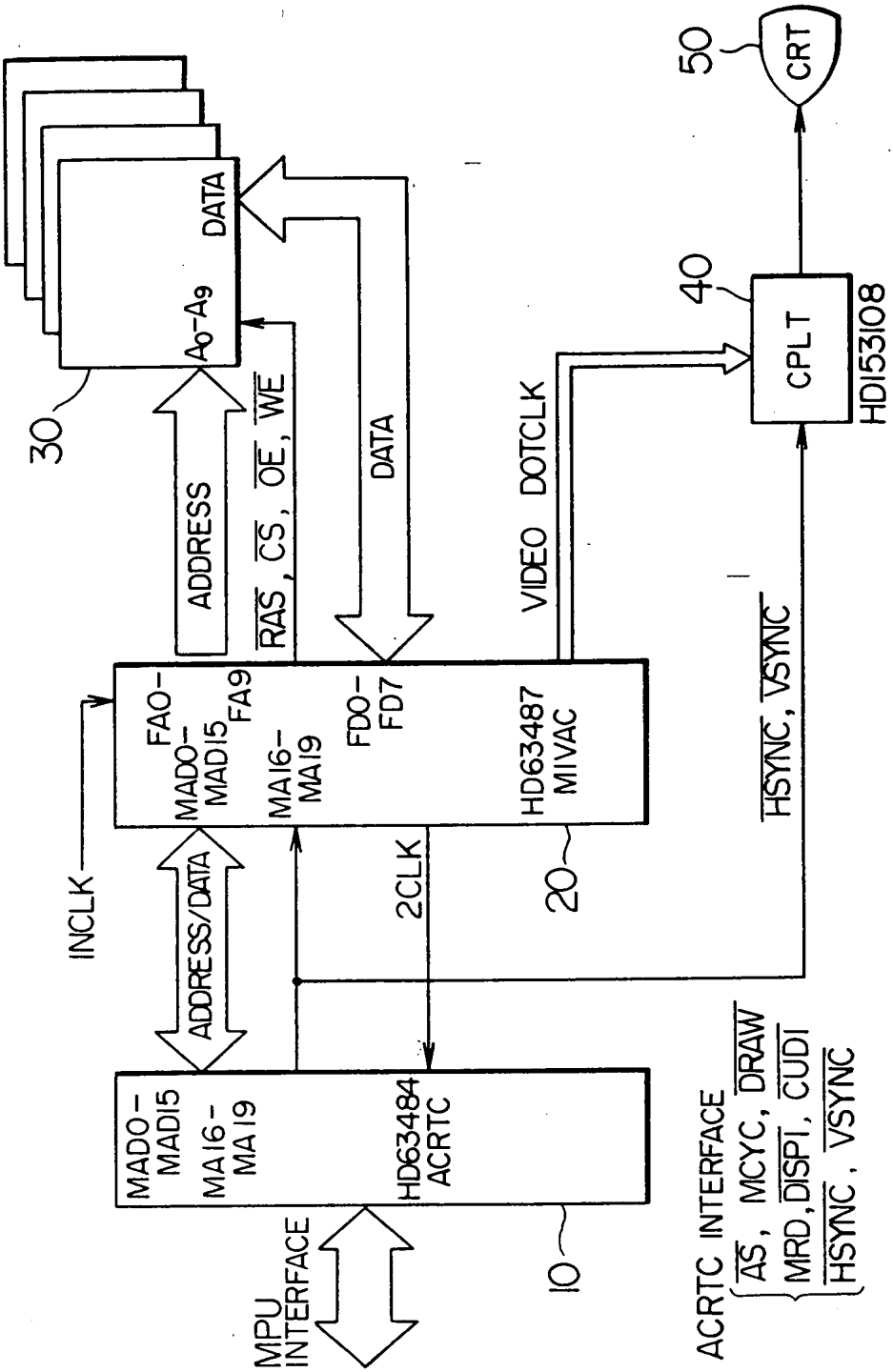

50
CRT
40
CPLT
HD153108
30
DATA
A0-A9
ADDRESS
RAS, CS, OE, WE
DATA
VIDEO DOTCLK
FA0-
MA0-MA15
MA16-MA19
FD0-FD7
HD63487
MIVAC
20
HSYNC, VSYNC
INCLK
ADDRESS/DATA
2CLK
MA0-MA15
MA16-MA19
HD63484
ACRTC
10
MPU INTERFACE
ACRTC INTERFACE
AS, MCYC, DRAW
MRD, DISPI, CUDI
HSYNC, VSYNC

FIG. 2

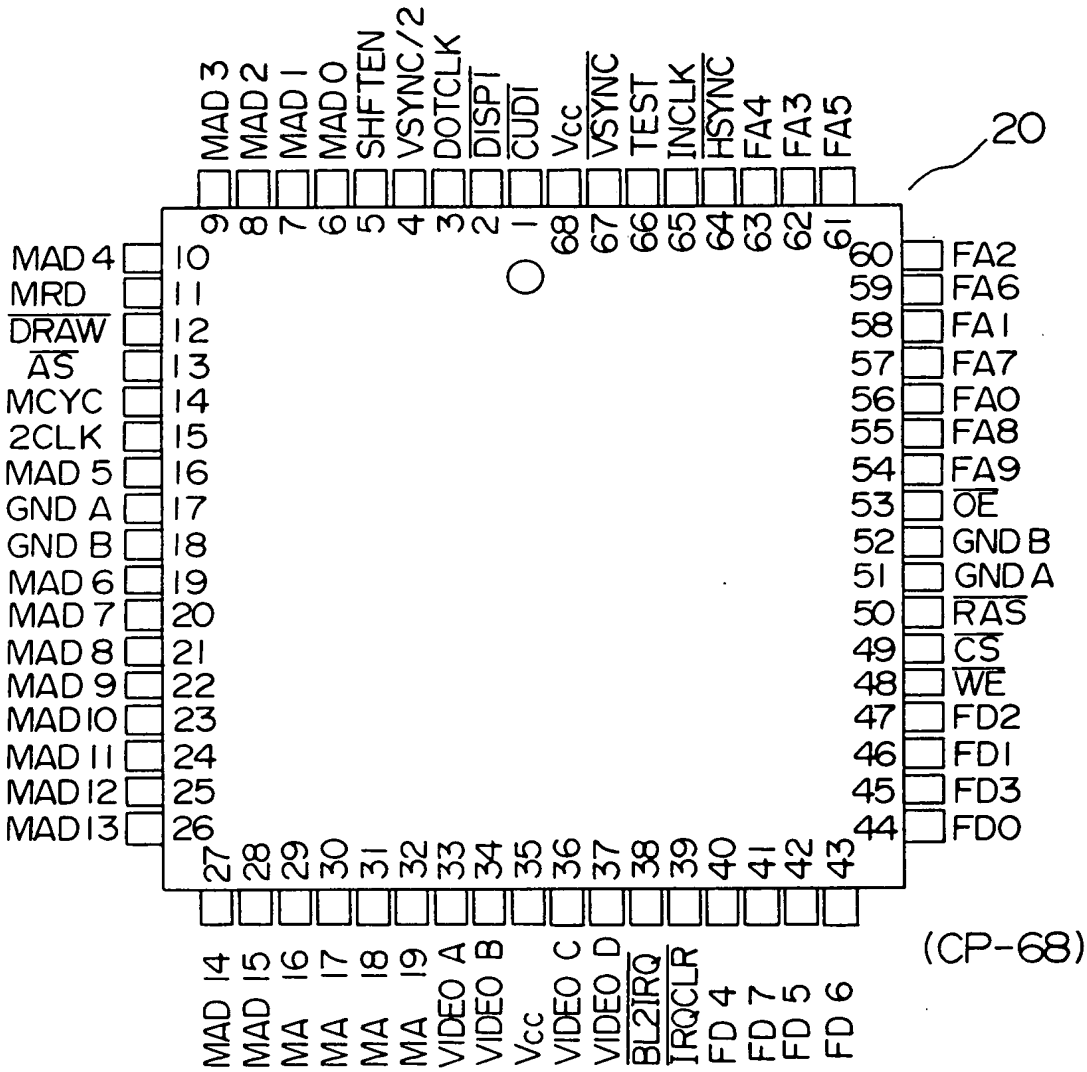

20
MAD 3
MAD 2
MAD 1
MAD 0
SHFTEN
VSYNC/2
DOTCLK
DISPT
CUDI
Vcc
VSYNC
TEST
INCLK
HSYNC
FA4
FA3
FA5
9
8
7
6
5
4
3
2
1
68
67
66
65
64
63
62
61
MAD 4 10
MRD 11
DRAW 12
AS 13
MCYC 14
2CLK 15
MAD 5 16
GND A 17
GND B 18
MAD 6 19
MAD 7 20
MAD 8 21
MAD 9 22
MAD 10 23
MAD 11 24
MAD 12 25
MAD 13 26
60 FA2
59 FA6
58 FA1
57 FA7
56 FA0
55 FA8
54 FA9
53 OE
52 GND B
51 GND A
50 RAS
49 CS
48 WE
47 FD2
46 FD1
45 FD3
44 FD0
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
MAD 14
MAD 15
MA 16
MA 17
MA 18
MA 19
VIDEO A
VIDEO B
Vcc
VIDEO C
VIDEO D
BL2IRQ
IRQCLR
FD 4
FD 7
FD 5
FD 6
(CP-68)

FIG. 3a

ITEM	TERMINAL NO.	TERMINAL NAME	INPUT/ OUTPUT	FUNCTION
POWER SUPPLY	35,68	Vcc	—	+ 5V IS SUPPLIED.
	17,18 51,52	Vcc	—	GND IS CONNECTED.
OPERATION CONTROL SIGNAL	65	INCLK	INPUT	BASIC CLOCK OF MIVAC IS INPUTTED.
	66	TEST	INPUT	MIVAC OPERATION IS TESTED. SET THIS TERMINAL TO "LOW" LEVEL.
ACRTC INTERFACE SIGNAL	15	2CLK	OUTPUT	2CLK SIGNAL IS SUPPIED TO ACRTC. THIS SIGNAL IS ASYMMETRIC, NAMELY, HAS DIFFERENT CYCLE LENGTHS IN THE FIRST HALF AND SECOND HALF OF A MEMORY CYCLE.
	14	MCYC	INPUT	MCYC SIGNAL FROM ACRTC IS INPUTTED. MCYC INDICATES "LOW" AND "HIGH" LEVELS WHEN ACRTC IS IN ADDRESS AND DATA CYCLES, RESPECTIVELY.
	12	$\overline{\text{DRAW}}$	INPUT	$\overline{\text{DRAW}}$ SIGNAL FROM ACRTC IS INPUTTED. $\overline{\text{DRAW}}$ INDICATES WHETHER OR NOT ACRTC IS IN THE DRAW CYCLE. $\overline{\text{DRAW}}$ IS "LOW" LEVEL IN THE DRAW CYCLE AND IS "HIGH" LEVEL IN THE OTHER CYCLES.
	11	MRD	INPUT	MRD SIGNAL FROM ACRTC IS INPUTTED. MRD CONTROLS DATA TRANSFER DIRECTION BETWEEN FRAME BUFFER AND ACRTC. WHEN DATA IS READ FROM FRAME BUFFER, "HIGH" LEVEL IS INPUTTED. WHEN DATA IS WRITTEN IN FRAME BUFFER, "LOW" LEVEL IS INPUTTED.
	13	$\overline{\text{AS}}$	INPUT	$\overline{\text{AS}}$ SIGNAL IS INPUTTED FROM ACRTC $\overline{\text{AS}}$ INDICATES PRESENCE OR ABSENCE OF MEMORY ACCESS.
	64	$\overline{\text{HSYNC}}$	INPUT	$\overline{\text{HSYNC}}$ SIGNAL IS INPUTTED FROM ACRTC. UNDER CONDITIONS OF HSYNC = "LOW" AND $\overline{\text{DRAW}}$ = "HIGH", IF AS PULSE IS RECEIVED, $\overline{\text{CS}}$ BEFORE $\overline{\text{RAS}}$ REFRESH OPERATION IS CARRIED OUT.
	67	$\overline{\text{VSYNC}}$	INPUT	$\overline{\text{VSYNC}}$ SIGNAL IS INPUTTED FROM ACRTC. RECEIVED $\overline{\text{VSYNC}}$ IS DIVIDED BY TWO SO AS TO OUTPUTTED AS VSYNC/2 SIGNAL AND IS ALSO USED TO CONTROL MULTIPLEXER OF VIDEO OUTPUT.
	2	$\overline{\text{DISP 1}}$	INPUT	$\overline{\text{DISP 1}}$ SIGNAL IS INPUTTED FROM ACRTC. $\overline{\text{DISP 1}}$ INDICATES SCREEN DISPLAY PERIOD. ORDINARILY, SET "1" TO DISPLAY SIGNAL CONTROL (DSC) BIT OF ACRTC.
	1	$\overline{\text{CUD1}}$	INPUT	$\overline{\text{CUD 1}}$ SIGNAL IS INPUTTED FROM ACRTIC. $\overline{\text{CUD 1}}$ IS LOADED WITH "LOW" LEVEL DURING GRAPHIC CURSOR DISPLAY PERIOD.
	6–10 16 19–28	MAD0 –MAD15	INPUT/ OUTPUT	MOD0–MAD 15 OF ACRTC ARE INPUTTED. THESE SIGNALS ARE USED AS FRAME BUFFER ACCESS ADDRESS IN ADDRESS CYCLE FOR MCYC = "LOW", AS DATA INPUT/ OUTPUT FOR DATA TRANSFER BETWEEN ACRTC AND FRAME BUFFER IN DATA TRANSFER CYCLE FOR MCYC = "HIGH".
	29-32	MA16– MA19	INPUT	FRAME BUFFER ACCESS ADDRESS MA16 – MA19 IS INPUTTED FROM ACRTC.

FIG. 3b

ITEM	TERMINAL NO.	TERMINAL NAME	INPUT/OUTPUT	FUNCTION
FRAME BUFFER INTERFACE SIGNAL	50	$\overline{RAS}$	OUTPUT	$\overline{RAS}$ TIMING SIGNAL IS OUTPUTTED FOR DRAM.
	49	$\overline{CS}$	OUTPUT	$\overline{CS}$ TIMING SIGNAL IS OUTPUTTED FOR DRAM.
	48	$\overline{WE}$	OUTPUT	$\overline{WE}$ TIMING SIGNAL IS OUTPUTTED FOR DRAM.
	53	$\overline{OE}$	OUTPUT	$\overline{OE}$ TIMING SIGNAL IS OUTPUTTED FOR DRAM.
	56,58 60,62 63,61 59,57 55,54	FA0-FA9	OUTPUT	MULTIPLEX ADDRESS IS OUTPUTTED FOR DRAM. ADDRESS TO BE MULTIPLEXED VARIES DEPENDING ON VCF0-VCF3 AND VMD0 ATTRIBUTE CODES.
	44,46 47,45 40,42 43,41	FD0-FD7	INPUT/OUTPUT	FD IS 8-BIT INPUT/OUTPUT SIGNAL FOR DATA TRANSFER BETWEEN ACRTC AND FRAME BUFFER AND FOR FETCHING DISPLAY DATA READ FROM FRAME BUFFER. IN A CASE OF ONE MEMORY CHIP, FD0-FD3 ARE USED, WHEREAS IN A CASE OF TWO FOUR MEMORY CHIPS, FD0-FD7 ARE USED.
CRT DISPLAY INTERFACE SIGNAL	3	DOTCLK	OUTPUT	DOTCLK SIGNAL IS DELIVERED BY DIVIDING INCLK SIGNAL AS BASIC INPUT SIGNAL OF MIVAC BY 1, 2 OR 4. DIVISION RATIO IS SET DEPENDING ON VCF0-VCF3 OF ATTRIBUTE CODE.
	33, 34 36, 37	VIDEO A -VIDEO D	OUTPUT	VIDEO A-DSIGNAL IS 4-BIT OUTPUT SIGNAL WHICH IS OBTAINED BY CONVERTING DISPLAY DATA FROM PARALLEL SIGNAL INTO SERIAL SIGNAL BY SHIFT REGISTER OF MIVAC AND WHICH IS DELIVERED DURING DISPLAY PERIOD INDICATED BY SHFTEN OUTPUT. 4-BIT VIDEO SIGNAL IS DETERMINED BY ATTRIBUTE CODE VCF0-VCF3.
	5	SHFTEN	OUTPUT	SHFTEN INDICATES DISPLAY PERIOD OF VIDEO SIGNAL AND IS SET TO "HIGH" LEVEL DURING DISPLAY PERIOD. IN SINGLE ACCESS, $\overline{DISP1}$ FROM ACRTC IS ELONGATED BACKWARD BY ONE CYCLE, AND IN DUAL ACCESS, $\overline{DISP1}$ IS ELONGATED BACKWARD BY TWO CYCLES SO AS TO PRODUCE THIS SIGNAL.
	4	VSYNC/2	OUTPUT	VSYNC/2 SIGNAL IS INPUTTED TO ACRTC. $\overline{VSYNC}$ IS DIVIDED BY TWO FOR PRODUCING THIS SIGNAL.
OTHERS	38	$\overline{BL2IRQ}$	OUTPUT	$\overline{BL2IRQ}$ IS SET BY BLINK2(MA19) INPUTTED IN ATTRIBUTE CYCLE. DURING ATTRIBUTE CYCLE, WHEN BLINK2 IS AT "HIGH" LEVEL, $\overline{BL2IRQ}$ IS SET TO "LOW" LEVEL.
	39	$\overline{IRQCLR}$	INPUT	$\overline{IRQCLR}$ SIGNAL IS USED TO CLEAR $\overline{BL2IRQ}$ SIGNAL. WHEN "LOW" IS INPUTTED TO $\overline{IRQCLR}$, $\overline{BL2IRQ}$ IS CLEARED TO "HIGH" LEVEL.

FIG. 4

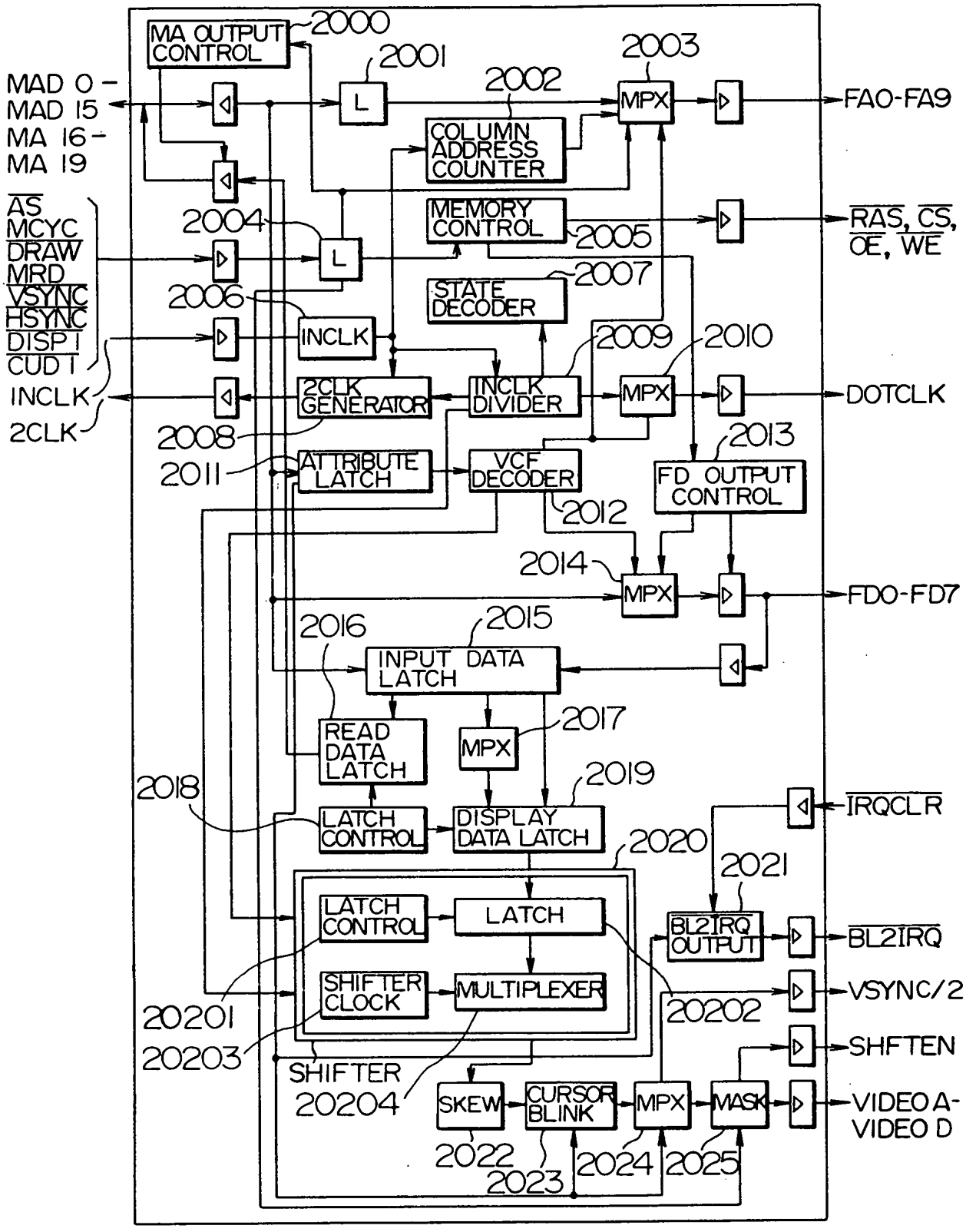

MA OUTPUT CONTROL
2000
2001
2002
2003
MAD 0 - MAD 15
MA 16 - MA 19
L
MPX
FA0-FA9
COLUMN ADDRESS COUNTER
AS
MCYC
DRAW
MRD
VSYNC
HSYNC
DISP I
CUD I
2004
MEMORY CONTROL
2005
RAS, CS, OE, WE
2006
STATE DECODER
2007
INCLK
2009
2010
INCLK
2CLK
2CLK GENERATOR
INCLK DIVIDER
DOTCLK
2008
2011
ATTRIBUTE LATCH
VCF DECODER
2012
FD OUTPUT CONTROL
2013
2014
FD0-FD7
2016
2015
INPUT DATA LATCH
READ DATA LATCH
2017
2018
2019
IRQCLR
LATCH CONTROL
DISPLAY DATA LATCH
2020
2021
LATCH
BL2IRQ OUTPUT
BL2IRQ
SHIFTER CLOCK
MULTIPLEXER
VSYNC/2
20201
20202
20203
SHIFTER
SHFTEN
20204
SKEW
CURSOR BLINK
MASK
VIDEO A-VIDEO D
2022
2023
2024
2025

FIG. 5a

1-CHIP MEMORY

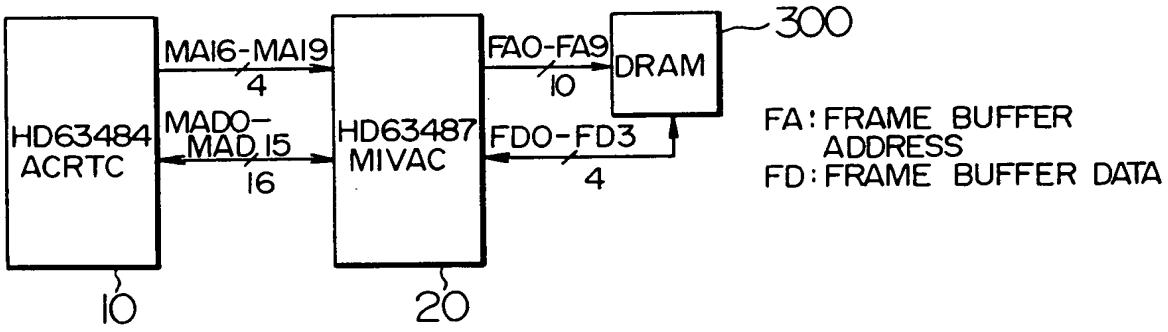


FIG. 5b 2-CHIP MEMORY

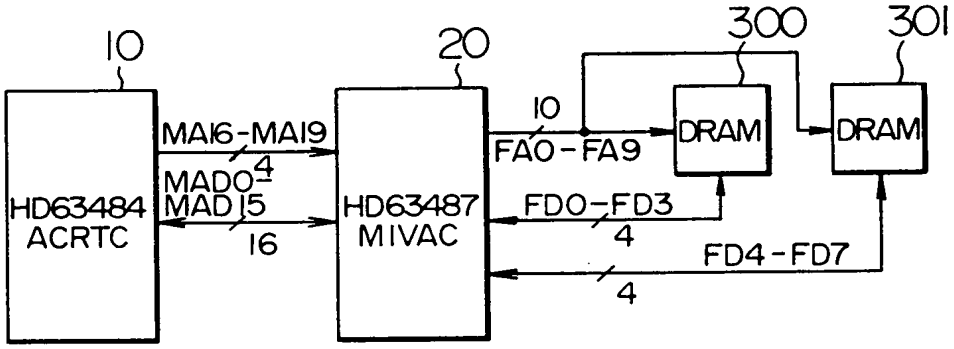


FIG. 5c

4-CHIP MEMORY

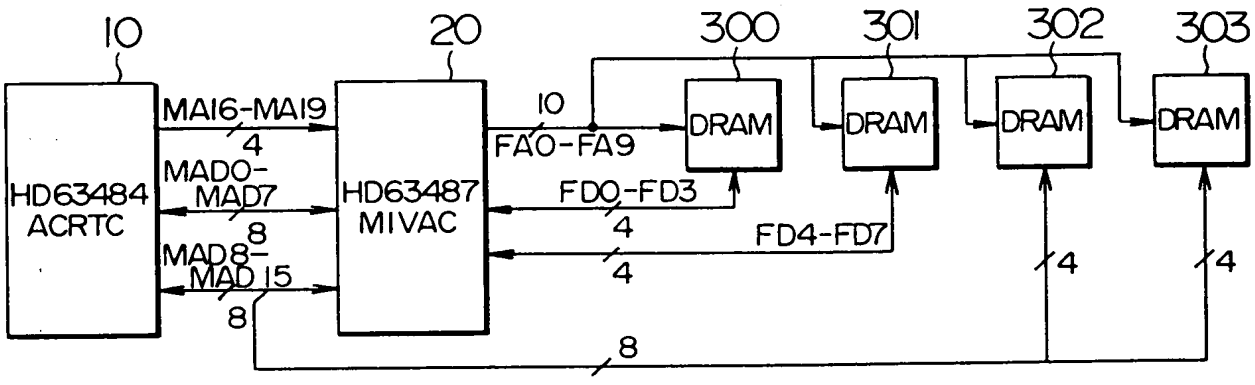


FIG. 6

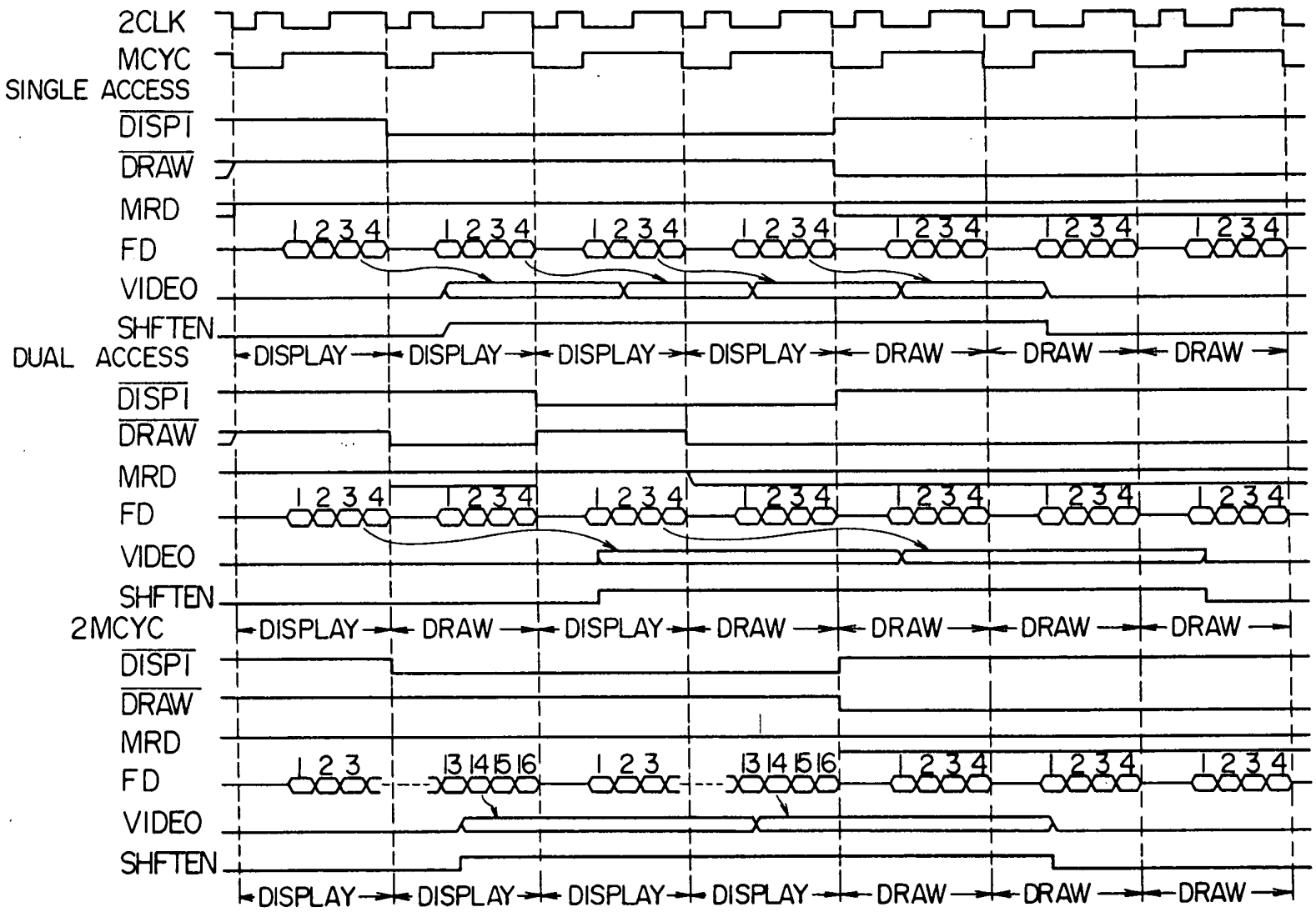

2CLK
MCYC
SINGLE ACCESS
DISPI
DRAW
MRD
FD
VIDEO
SHFTEN
DISPLAY
DISPLAY
DISPLAY
DISPLAY
DRAW
DRAW
DRAW
DUAL ACCESS
DISPI
DRAW
MRD
FD
VIDEO
SHFTEN
2MCYC
DISPLAY
DRAW
DISPLAY
DRAW
DRAW
DRAW
DRAW
DISPI
DRAW
MRD
FD
VIDEO
SHFTEN
DISPLAY
DISPLAY
DISPLAY
DISPLAY
DRAW
DRAW
DRAW

FIG. 7

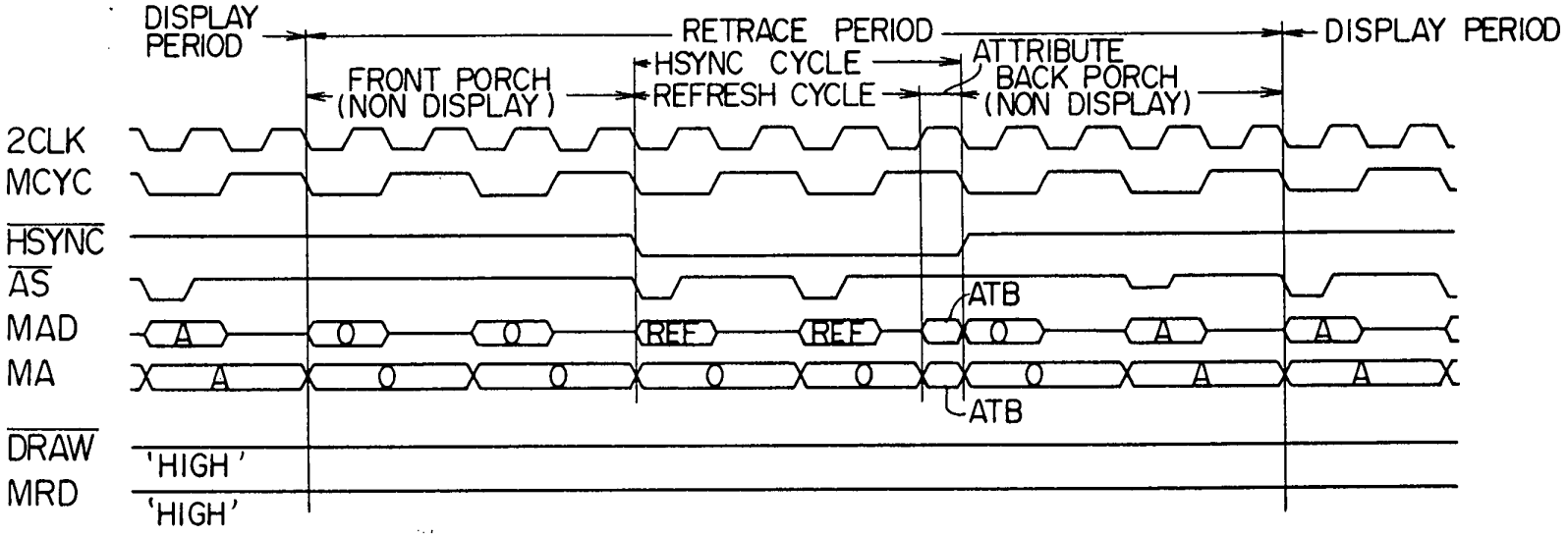


FIG. 11

CUR 1	CUR 0	CURSOR DISPLAY COLOR
0	0	BLACK (VIDEO A - VIDEO D = 0)
0	1	WHITE (VIDEO A - VIDEO D = 1)
1	0	COLOR REVERSION FOR EACH BIT OF VIDEO A - VIDEO D
1	1	COLOR REVERSION FOR EACH BIT OF VIDEO A - VIDEO C (VIDEO D IS KEPT UNCHANGED)

F I G. 8

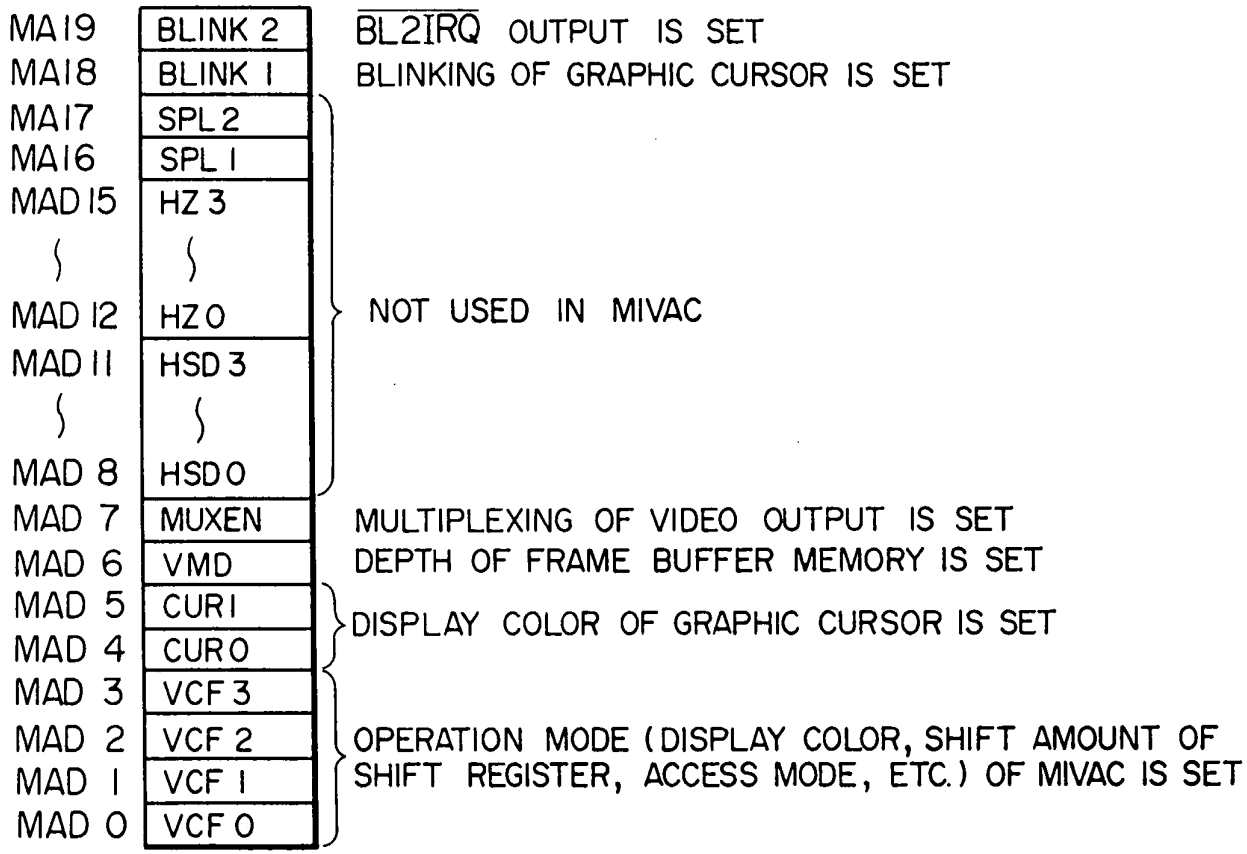

MA19
BLINK 2
BL2IRQ OUTPUT IS SET
MA18
BLINK 1
BLINKING OF GRAPHIC CURSOR IS SET
MA17
SPL 2
MA16
SPL 1
MAD 15
HZ 3
MAD 12
HZ 0
NOT USED IN MIVAC
MAD 11
HSD 3
MAD 8
HSD 0
MAD 7
MUXEN
MULTIPLEXING OF VIDEO OUTPUT IS SET
MAD 6
VMD
DEPTH OF FRAME BUFFER MEMORY IS SET
MAD 5
CUR 1
MAD 4
CUR 0
DISPLAY COLOR OF GRAPHIC CURSOR IS SET
MAD 3
VCF 3
MAD 2
VCF 2
MAD 1
VCF 1
MAD 0
VCF 0
OPERATION MODE (DISPLAY COLOR, SHIFT AMOUNT OF SHIFT REGISTER, ACCESS MODE, ETC.) OF MIVAC IS SET

FIG. 9

MODE	CRT SCREEN LAYOUT EXAMPLE (DOTS X RASTER)	MAXIMUM FRAME BUFFER CAPACITY (BYTES)	ACRTC OPERATION FREQUENCY (MHz)	MEMORY ACCESS SPEED	HIGH-SPEED DRAWING	NUMBER OF MEMORIES	COLOR/ GRADATION	SHIFT AMOUNT (BITS)	MAXIMUM DOT CLOCK FREQ. (MHz)
0	640×200, 350, 400, 480	512K/128K	4.13	480 ns/ 4ACCESSES	—	1		16	33
1	640×200, 480×240, 320×200, 240						4	8	16.5
2	320×200, 240 266×192						16	4	8.25
3	640×200, 350, 400, 480	1M/256K				2	4	16	33
4	640×200, 480×240, 320×200, 240						16	8	16.5
5	640×200, 350, 400, 480	2M/512K				4		16	33
6	640×200, 480×240, 320×200, 240	512K/128K			○	1			16.5
7	320×200, 240 256×192,						4	8	8.25
8	640×200, 350, 400, 480	1M/256K				2		32	33
9	640×200, 480×240, 320×200, 240						4	16	16.5
A	320×200, 240 256×192						16	8	8.25
B	640×200, 350, 400, 480	2M/512K				4	4	32	33
C	640×200, 480×240, 320×200, 240						16	16	16.5
D	640×200, 350, 400, 480	512K/128K		960 ns/ 16ACCESSES	—	1	4	32	33
E	640×200, 480×240, 320×200, 240						16	16	16.5
F	640×200, 350, 400, 480	1M/256K				2		32	33

FIG. 10

MODE	DOT CLOCK FREQUENCY
0, 3, 5, 8 B, D, F	33MHz ~ 11MHz
1, 4, 6, 9 C, E	16.5MHz ~ 5.5MHz
2, 7, A	8.25MHz ~ 2.75MHz

FIG. 12

VMD	MEMORY CHIP EMPLOYED
0	256K × 4BIT DRAM
1	1M × 4BIT DRAM

FIG. 13

MUXEN	VSYNC/2	VIDEO A	VIDEO B
0	0	A	B
	1	A	B
1	0	A	B
	1	C	D

FIG. 14

BLINK 1	GRAPHIC CURSOR DISPLAY
0	NOT DISPLAYED
1	DISPLAYED

FIG. 15a

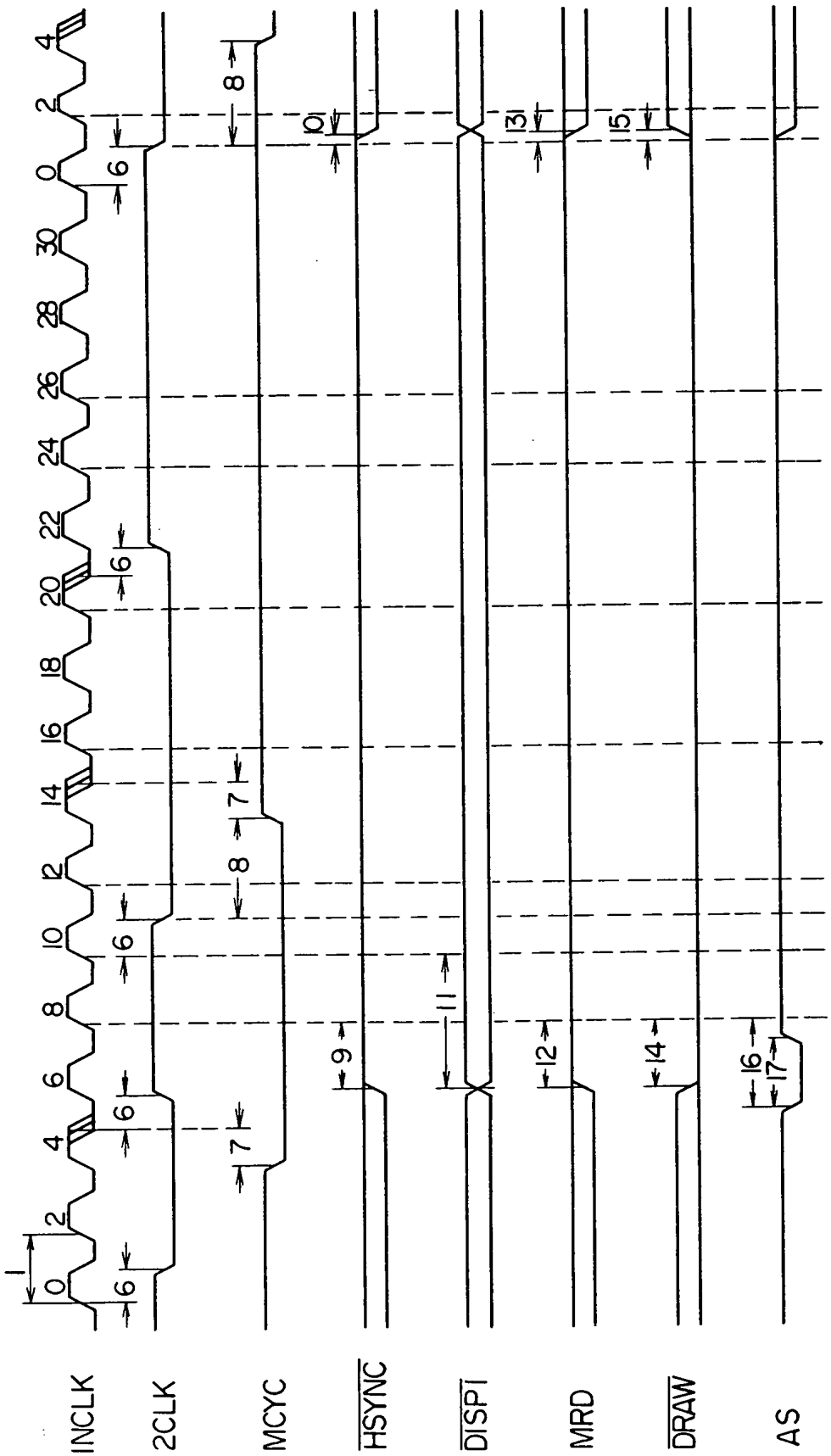


FIG. 15b

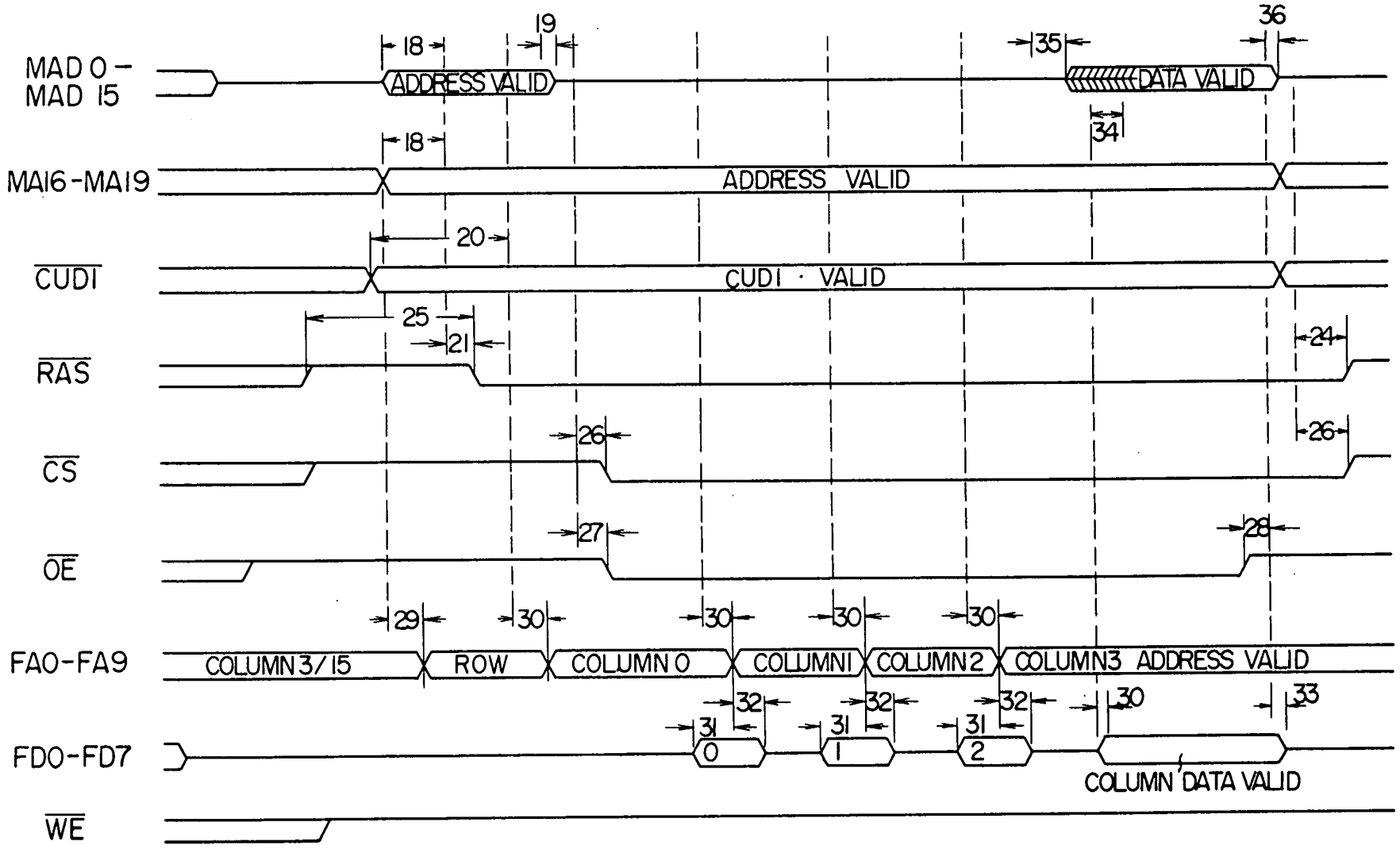
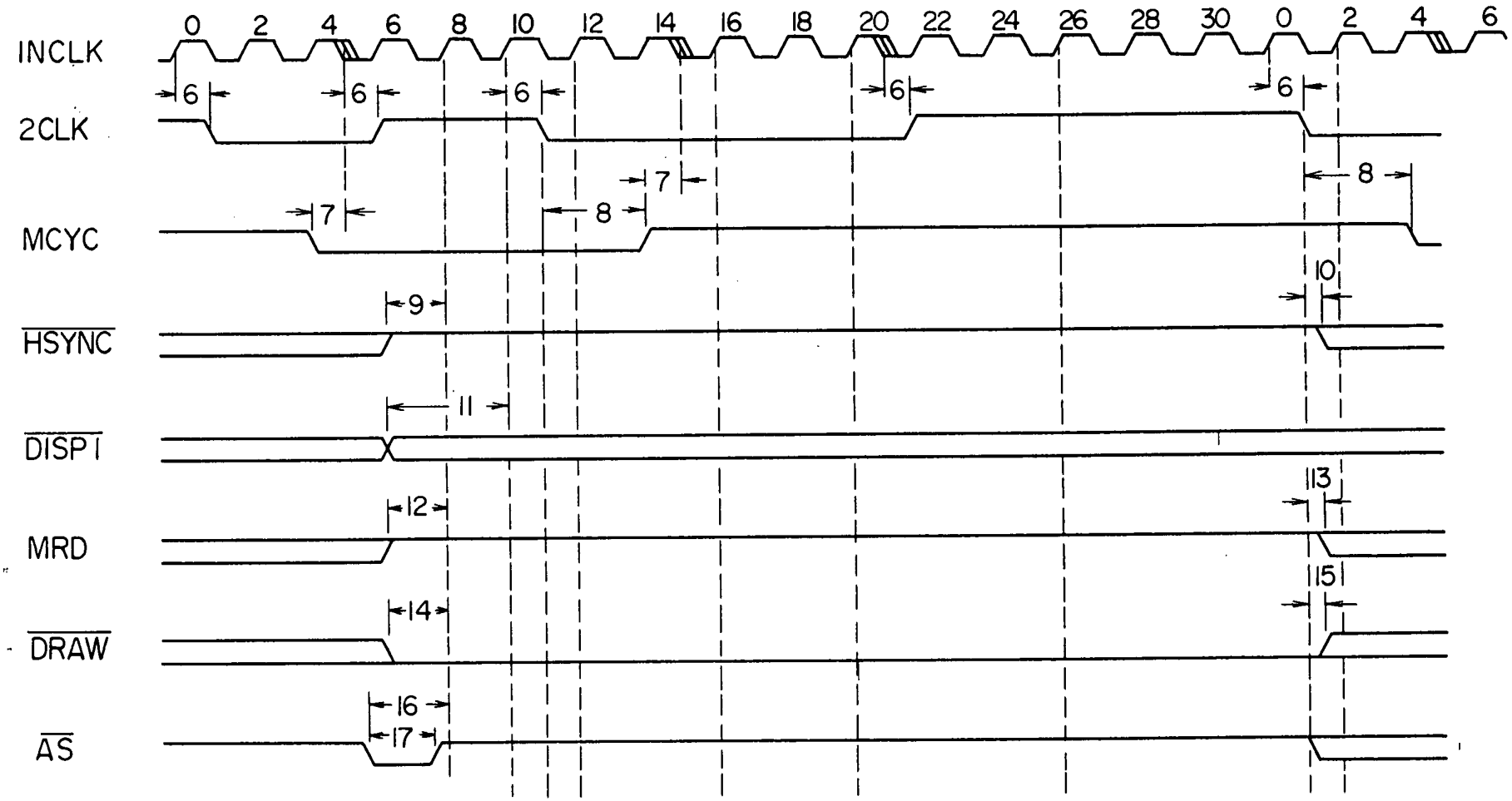

MAD 0 – MAD 15
ADDRESS VALID
DATA VALID
MA16-MA19
ADDRESS VALID
CUDI
CUDI · VALID
RAS
CS
OE
FA0-FA9
COLUMN 3/15
ROW
COLUMN 0
COLUMN1
COLUMN 2
COLUMN3 ADDRESS VALID
FD0-FD7
COLUMN DATA VALID
WE
18
19
35
36
34
20
25
21
24
26
27
28
29
30
31
32
33

FIG. 16a


INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 0 2 4 6
6
7
8
9
10
11
12
13
14
15
16
17

F I G. 16b

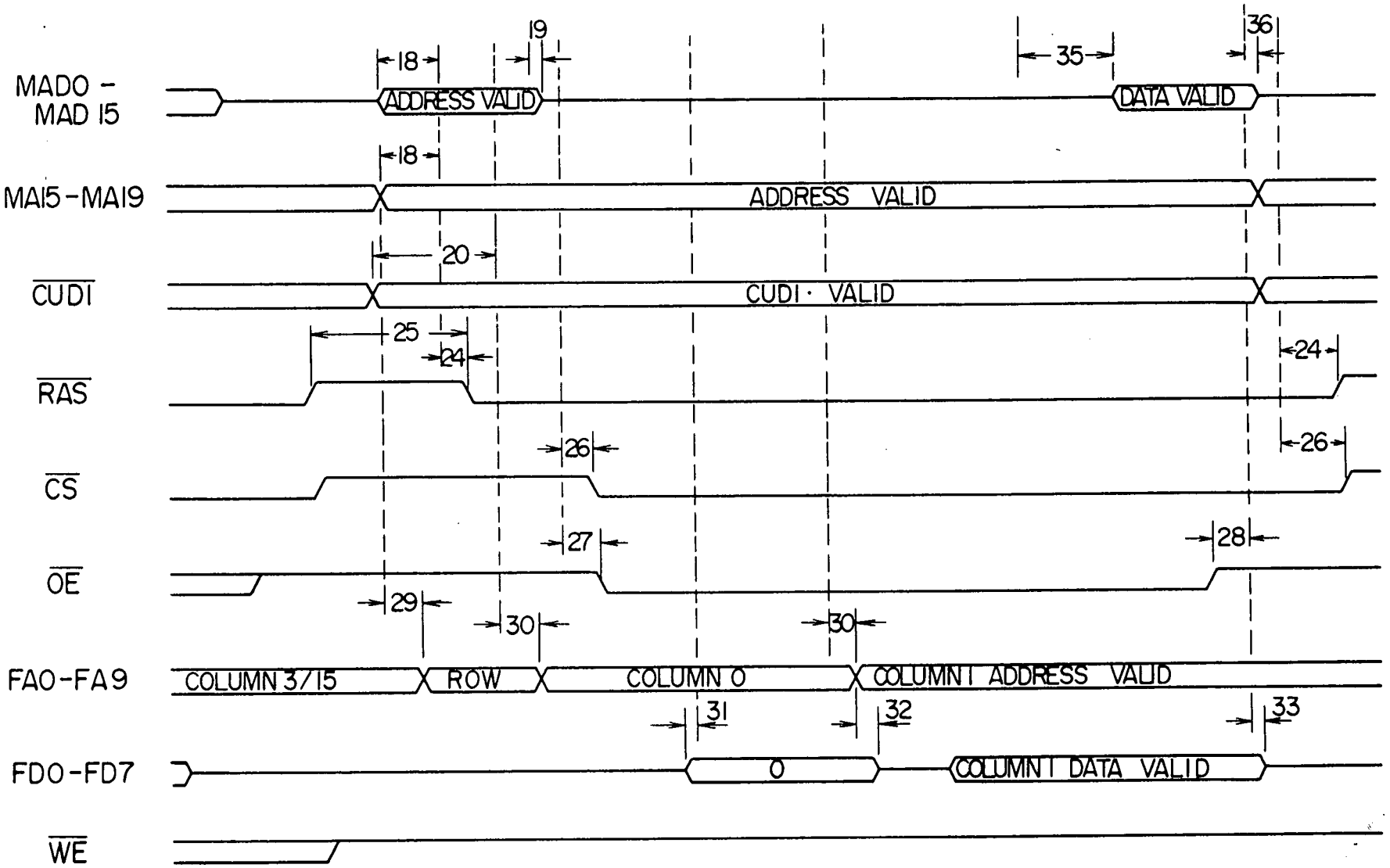

MAD0 - MAD 15
MA15-MA19
CUDI
RAS
CS
OE
FA0-FA9
FD0-FD7
WE
ADDRESS VALID
DATA VALID
ADDRESS VALID
CUDI · VALID
COLUMN 3/15
ROW
COLUMN 0
COLUMN1 ADDRESS VALID
0
COLUMN1 DATA VALID
18
19
35
36
20
25
24
26
27
28
29
30
31
32
33

FIG. 17a

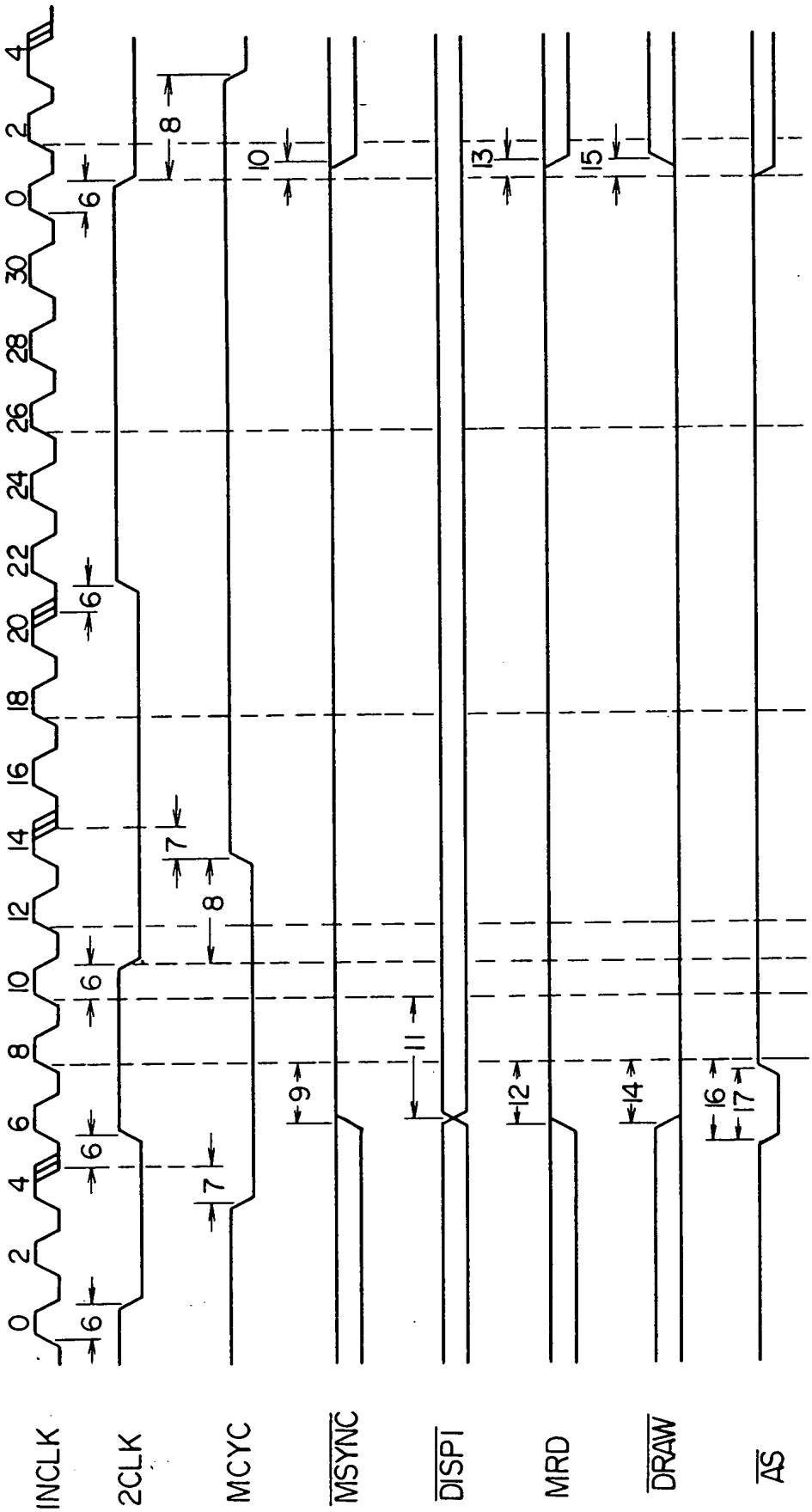

INCLK
2CLK
MCYC
MSYNC
DISPI
MRD
DRAW
AS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
2
4
6
6
6
6
6
7
7
8
8
9
10
11
12
13
14
15
16
17

FIG. 17b

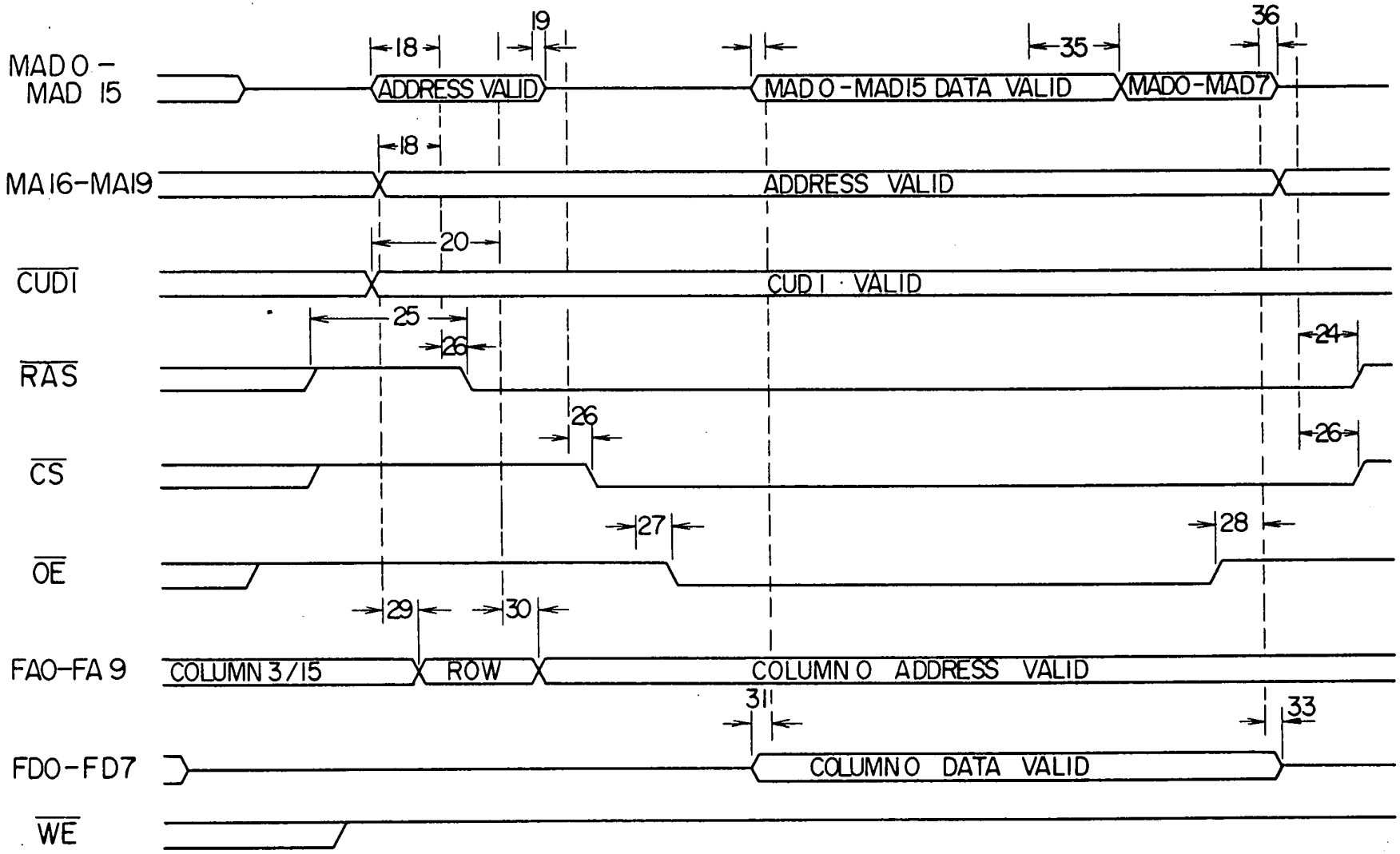

MAD0 - MAD 15
ADDRESS VALID
MAD0-MAD15 DATA VALID
MAD0-MAD7
MA16-MA19
ADDRESS VALID
CUDI
CUDI VALID
RAS
CS
OE
FA0-FA9
COLUMN 3/15
ROW
COLUMN 0 ADDRESS VALID
FD0-FD7
COLUMN 0 DATA VALID
WE
18
19
35
36
20
25
26
24
27
28
29
30
31
33

FIG. 18a

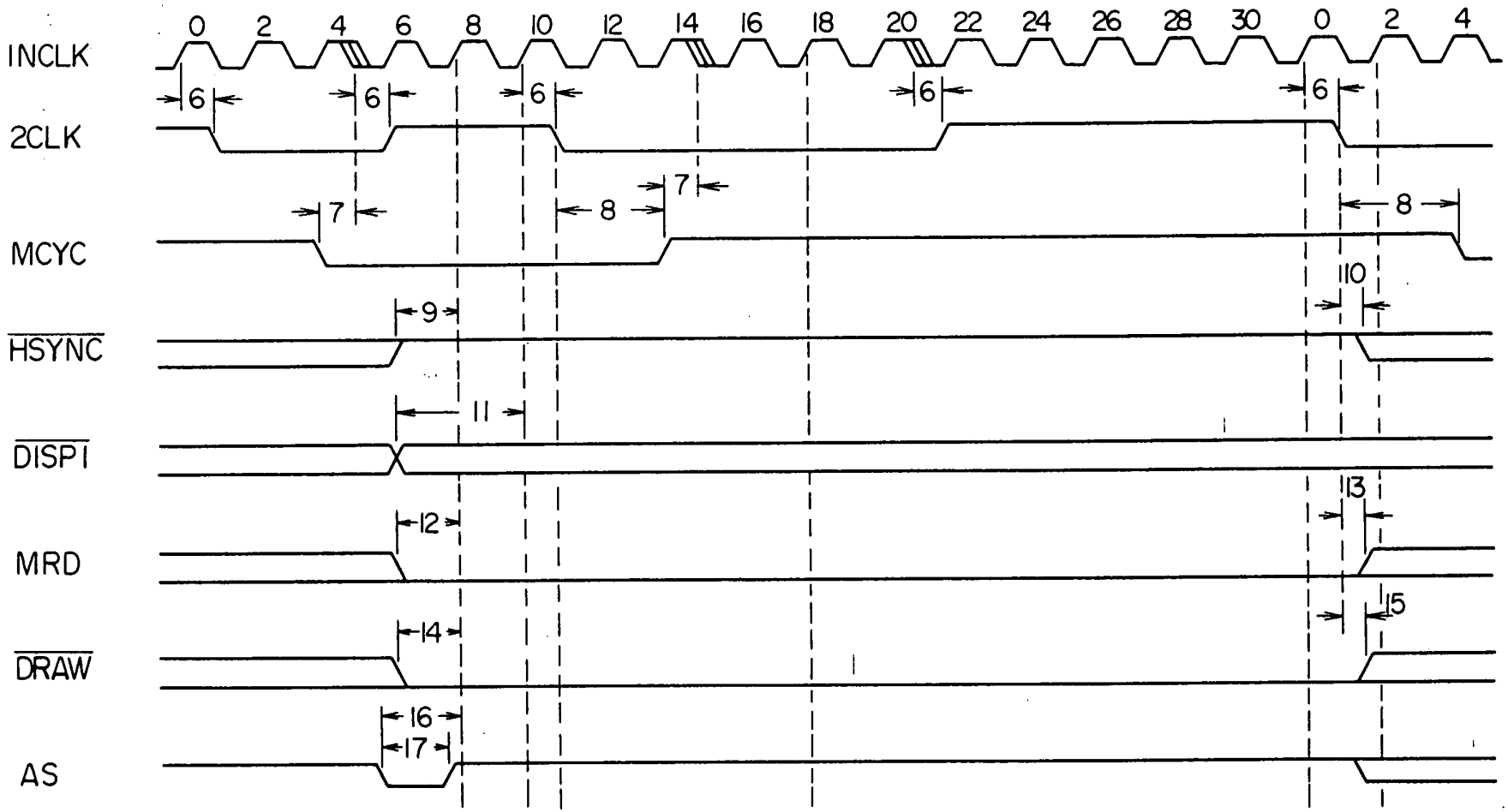

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 0 2 4
INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
6
7
8
9
10
11
12
13
14
15
16
17

FIG. 18b

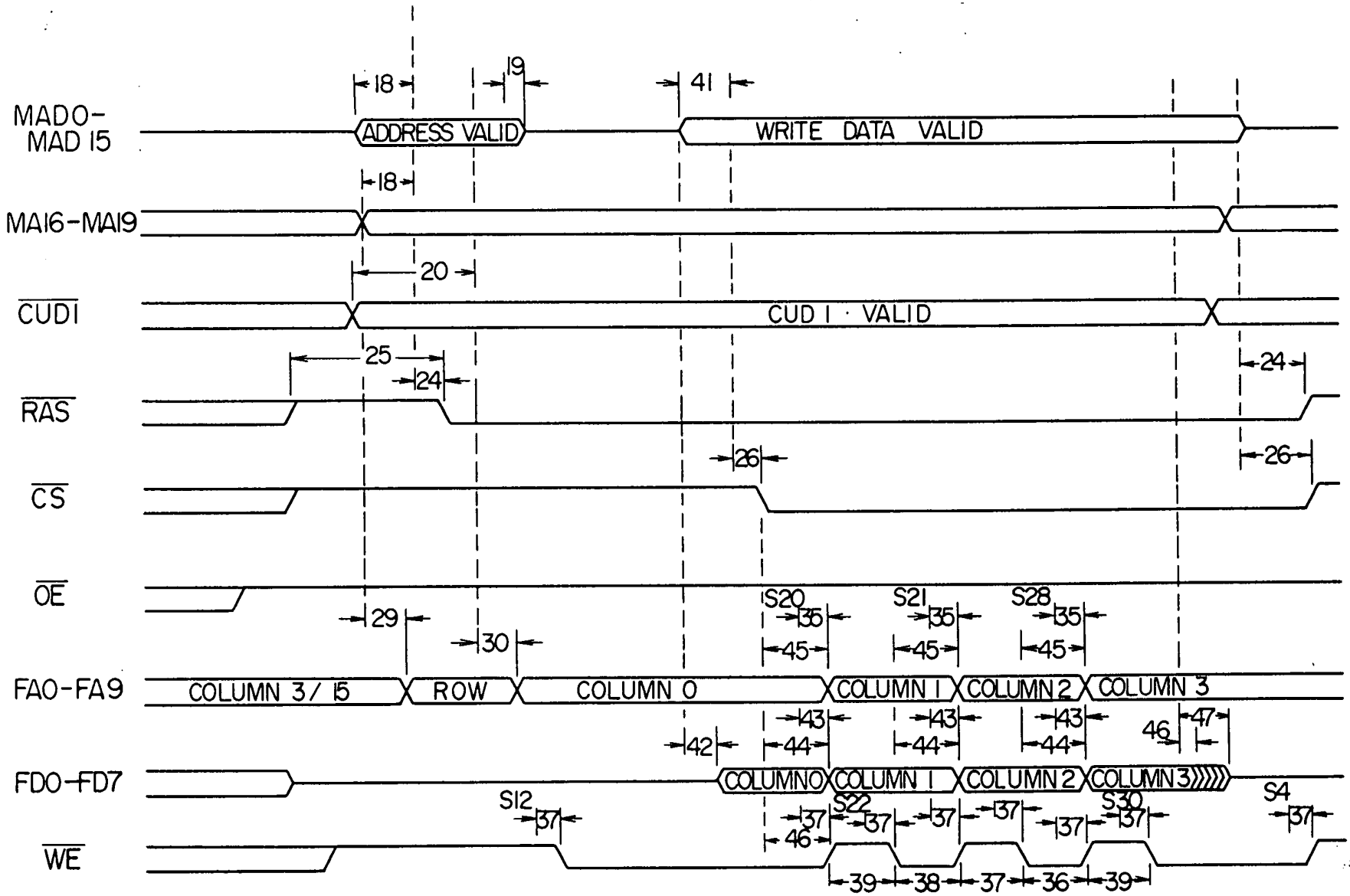

MAD0-MAD15
ADDRESS VALID
WRITE DATA VALID
MA16-MA19
CUD1
CUD1 VALID
RAS
CS
OE
FA0-FA9
COLUMN 3/15
ROW
COLUMN 0
COLUMN 1
COLUMN 2
COLUMN 3
FD0-FD7
WE
18
19
41
20
25
24
26
29
30
S20
S21
S28
35
45
43
44
42
46
47
S12
S22
S30
S4
37
39
38
36

FIG. 19a

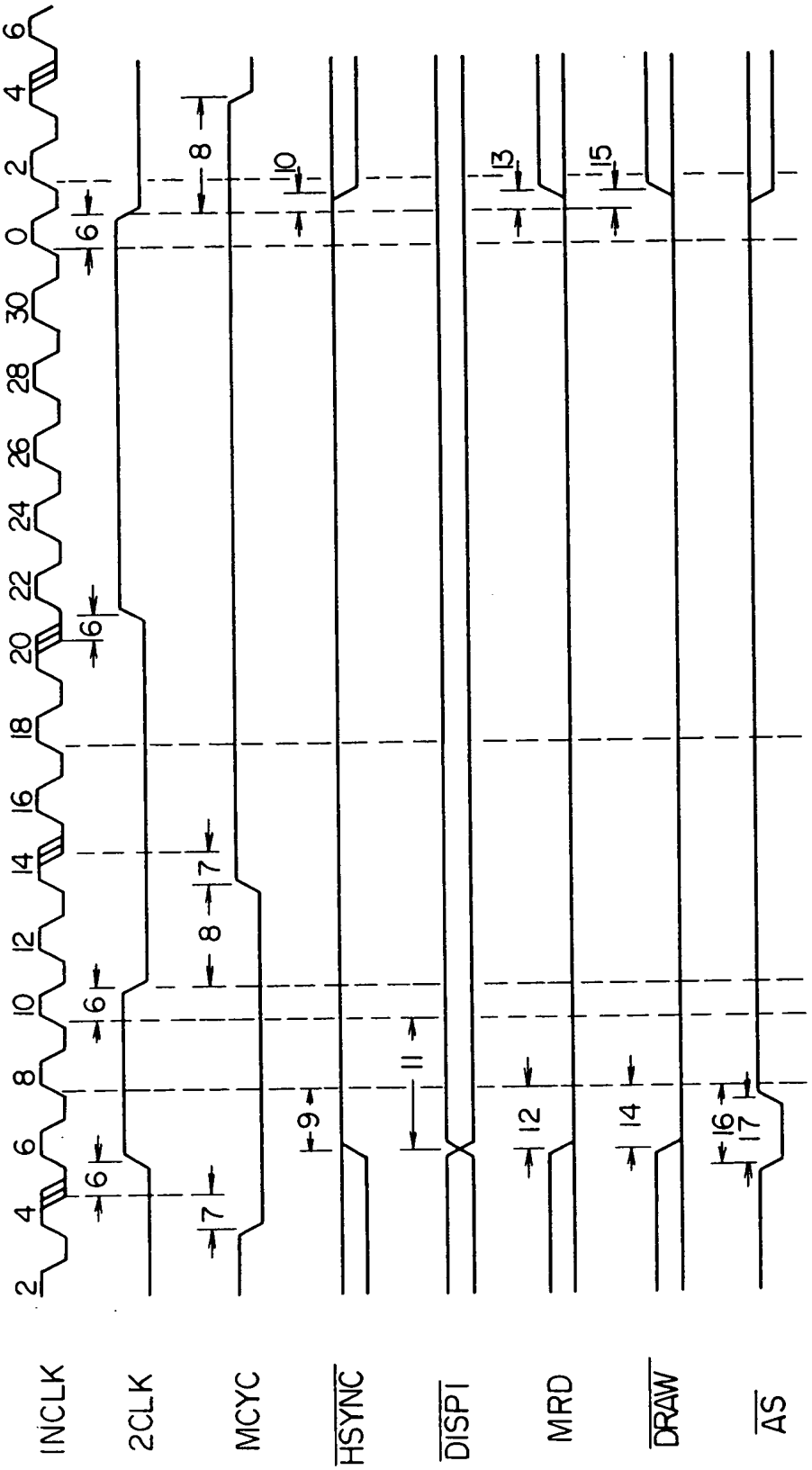

INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
2
4
6
6
6
6
7
7
8
8
9
10
11
12
13
14
15
16
17

FIG. 19b

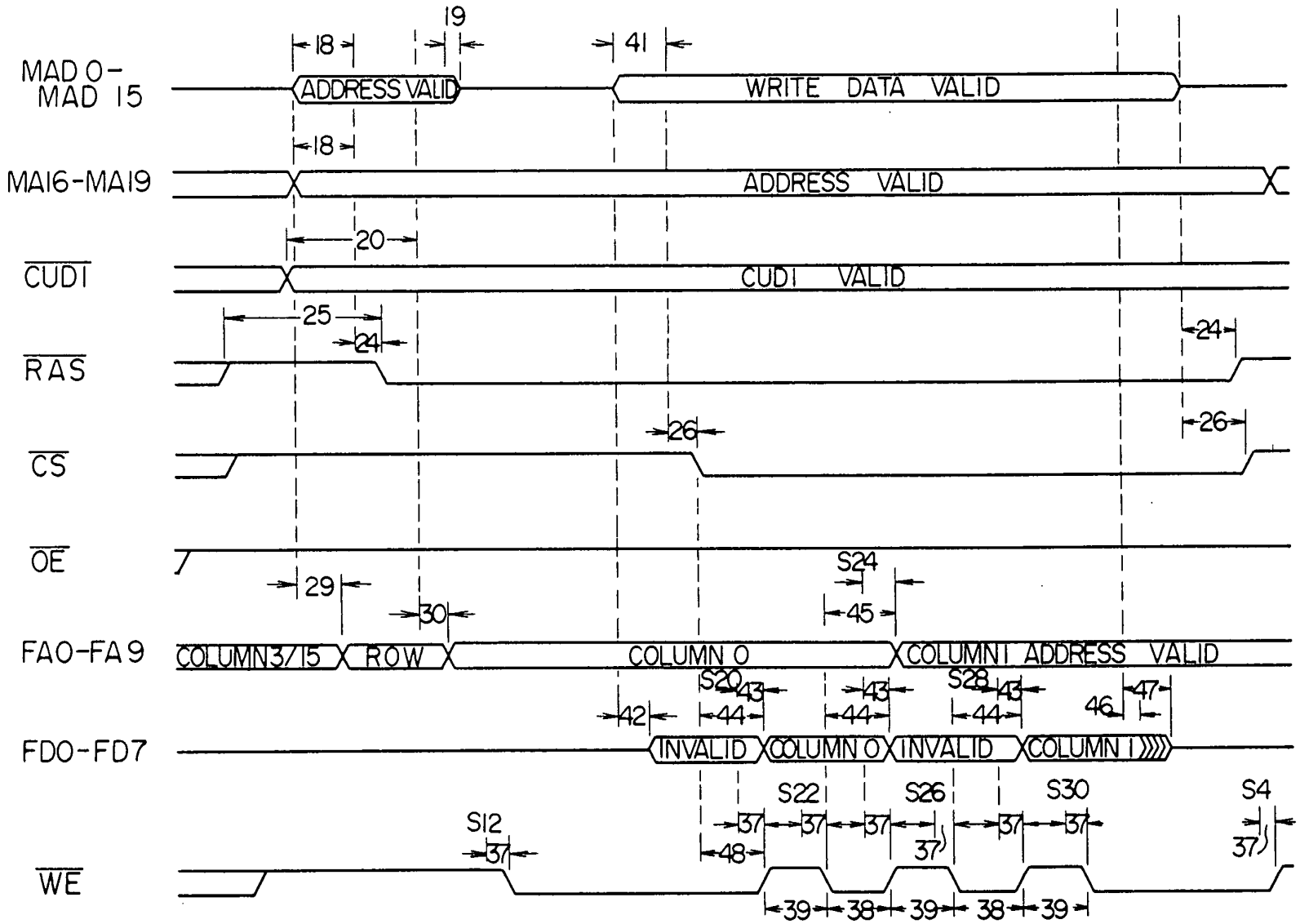

MAD 0-
MAD 15
MA16-MA19
CUDI
RAS
CS
OE
FA0-FA9
FD0-FD7
WE
ADDRESS VALID
WRITE DATA VALID
ADDRESS VALID
CUDI VALID
COLUMN3/15
ROW
COLUMN 0
COLUMN1 ADDRESS VALID
INVALID
COLUMN 0
INVALID
COLUMN 1
18
19
41
20
25
24
26
29
30
S24
45
S20
43
42
44
S28
46
47
S12
37
S22
S26
S30
S4
48
39
38

FIG. 20a

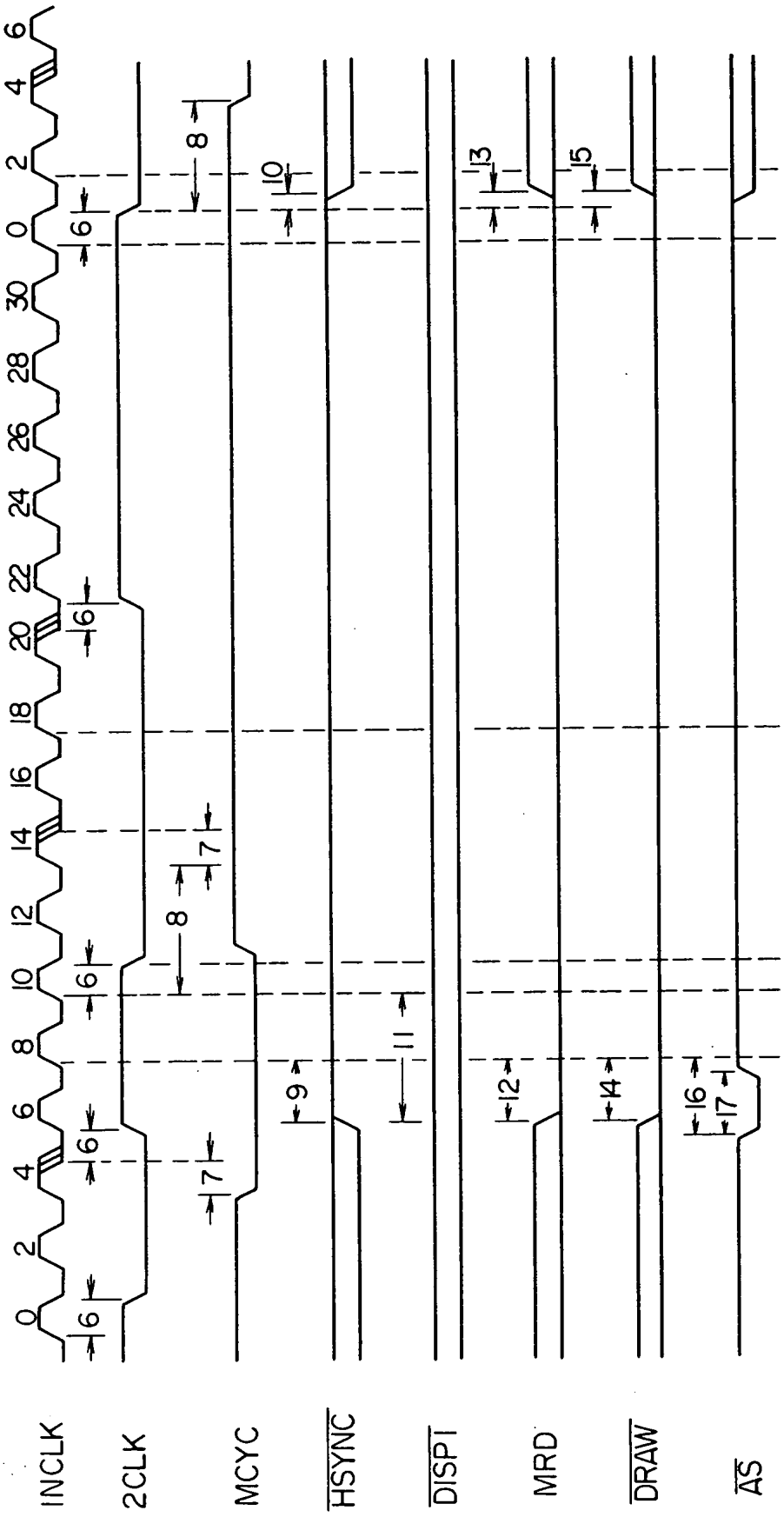

INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
2
4
6
6
6
6
6
6
7
7
8
8
9
10
11
12
13
14
15
16
17

FIG. 20b

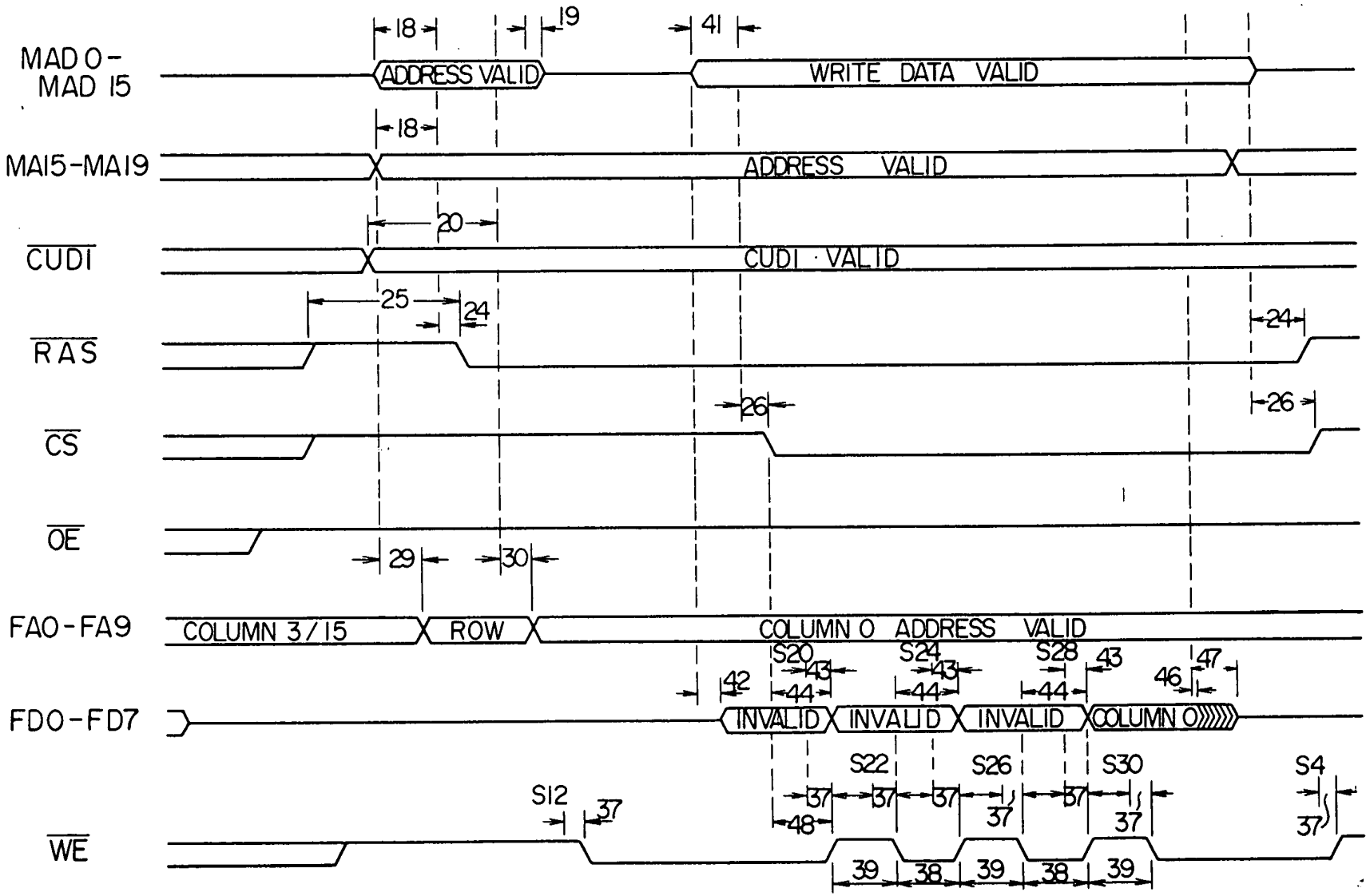

MAD 0-
MAD 15
MAI5-MAI9
CUDI
RAS
CS
OE
FA0-FA9
FD0-FD7
WE
18
19
41
ADDRESS VALID
WRITE DATA VALID
ADDRESS VALID
20
CUDI VALID
25
24
26
29
30
COLUMN 3/15
ROW
COLUMN 0 ADDRESS VALID
S20
S24
S28
42
43
44
46
47
INVALID
INVALID
INVALID
COLUMN 0
S12
S22
S26
S30
S4
37
48
39
38

FIG. 21a

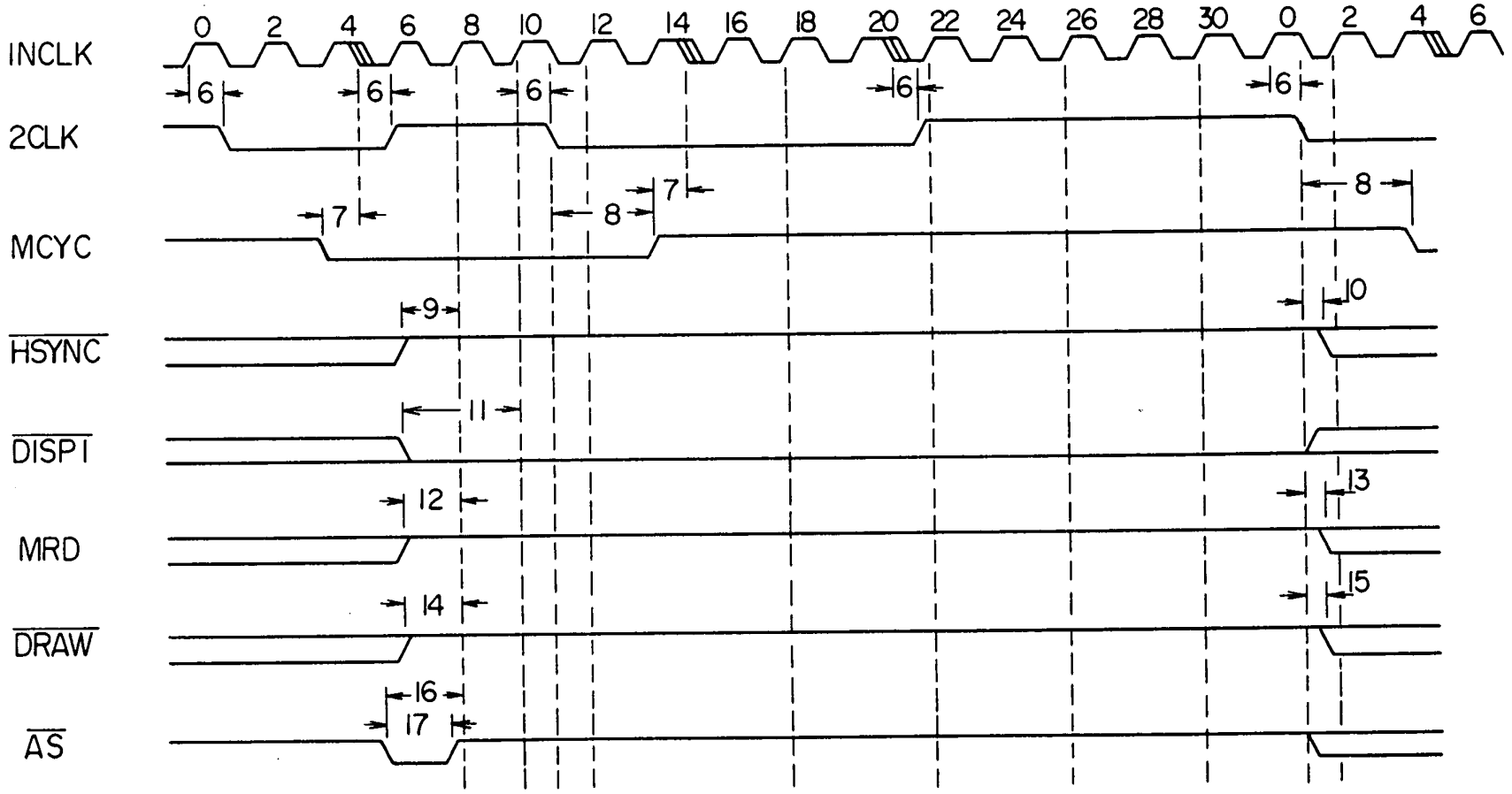

INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 0 2 4 6
6
7
8
9
10
11
12
13
14
15
16
17

FIG. 21b

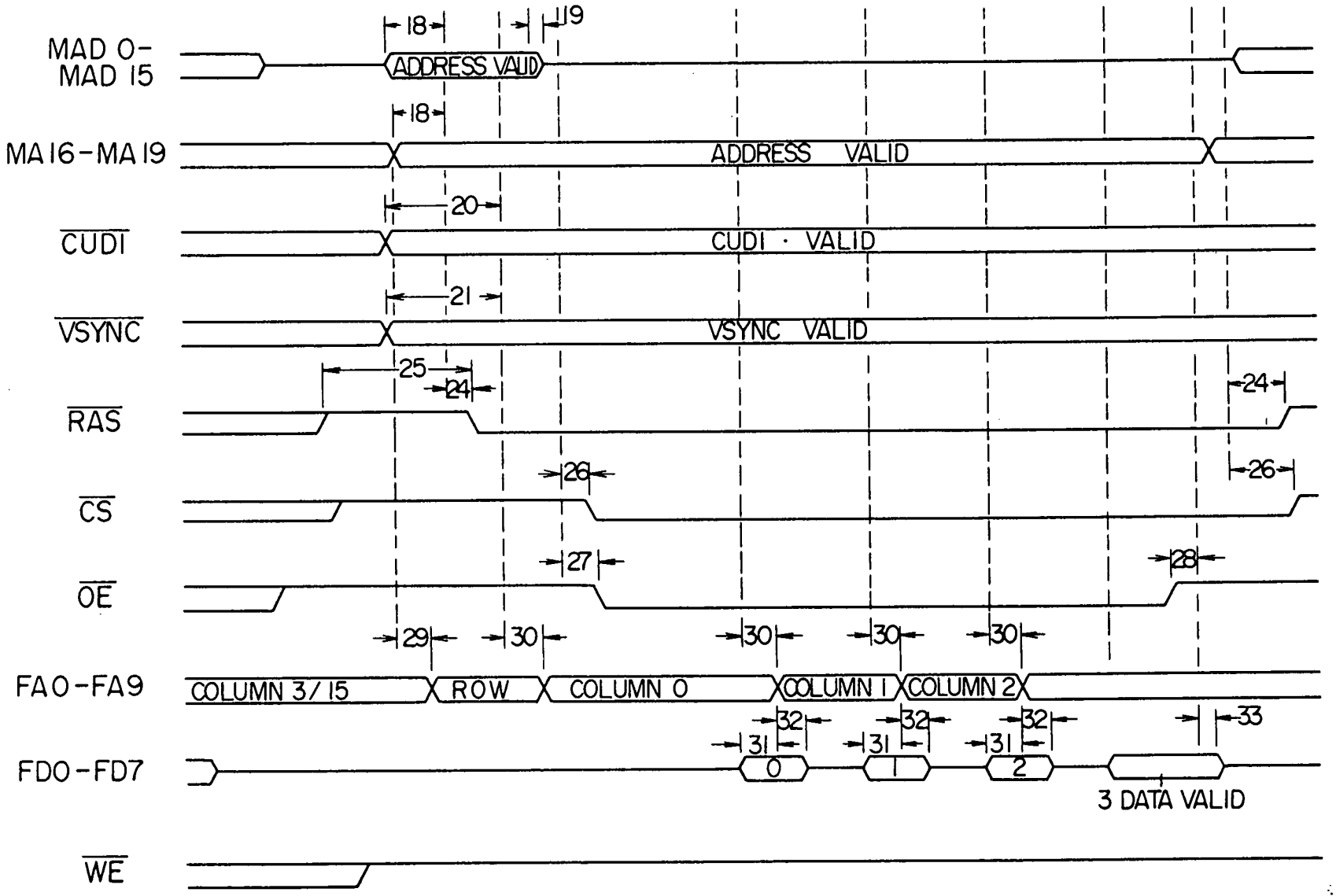

MAD 0-
MAD 15
18
19
ADDRESS VAUD
MA16-MA19
ADDRESS VALID
CUDI
20
CUDI · VALID
VSYNC
21
VSYNC VALID
RAS
25
24
26
CS
27
OE
28
29
30
FA0-FA9
COLUMN 3/15
ROW
COLUMN 0
COLUMN 1
COLUMN 2
31
32
33
FD0-FD7
0
1
2
3 DATA VALID
WE

FIG. 22a

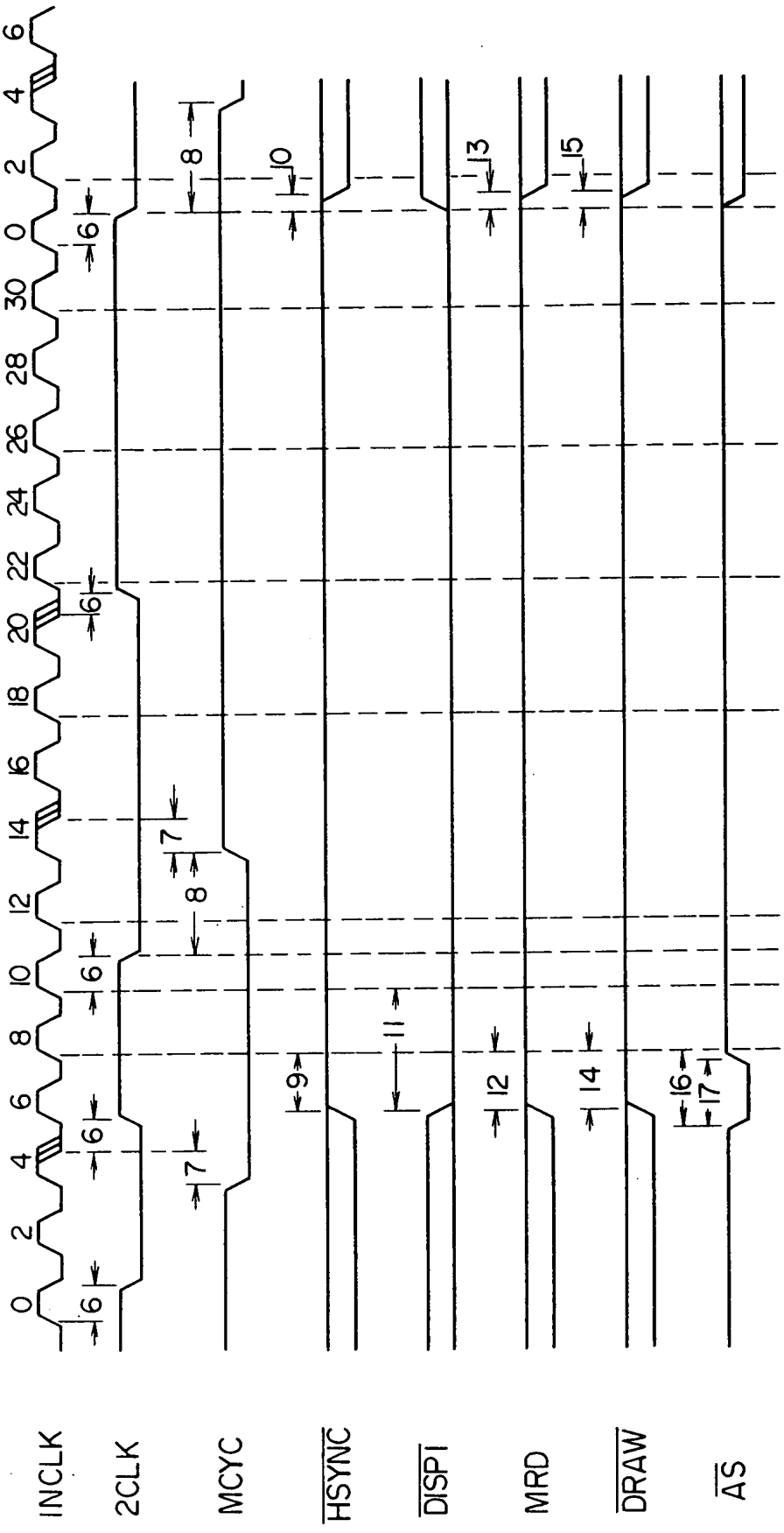

INCLK
2CLK
MCYC
HSYNC
DISP1
MRD
DRAW
AS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
2
4
6
6
6
6
6
7
7
8
8
9
10
11
12
13
14
15
16
17

FIG. 22b

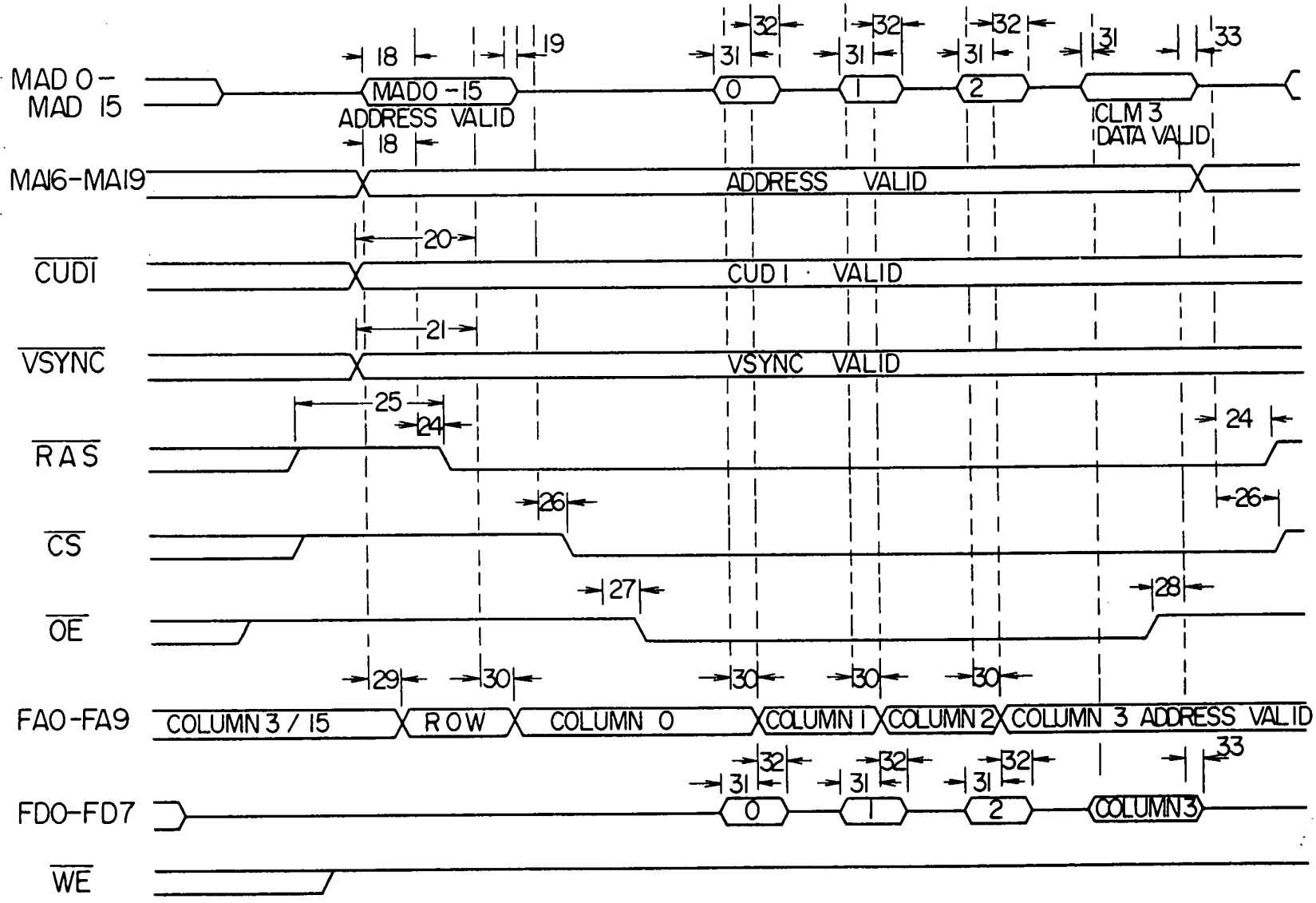

MAD 0-
MAD 15
MAD0-15
ADDRESS VALID
CLM 3
DATA VALID
MA16-MA19
ADDRESS VALID
CUDI
CUDI VALID
VSYNC
VSYNC VALID
RAS
CS
OE
FA0-FA9
COLUMN 3 / 15
ROW
COLUMN 0
COLUMN 1
COLUMN 2
COLUMN 3 ADDRESS VALID
FD0-FD7
COLUMN3
WE
18
19
20
21
24
25
26
27
28
29
30
31
32
33

FIG. 23a

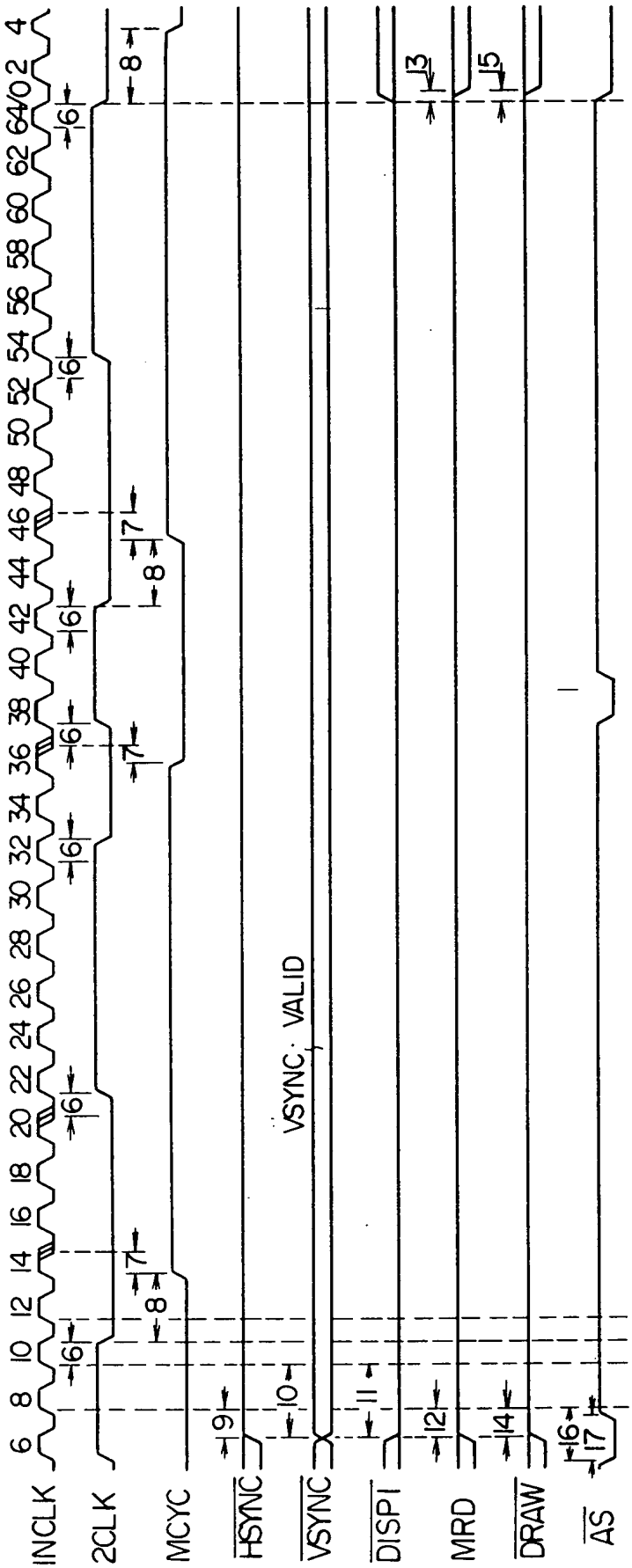

INCLK
2CLK
MCYC
HSYNC
VSYNC
DISPI
MRD
DRAW
AS
VSYNC: VALID
6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64/0 2 4
6
7
8
9
10
11
12
13
14
15
16
17

FIG. 23b

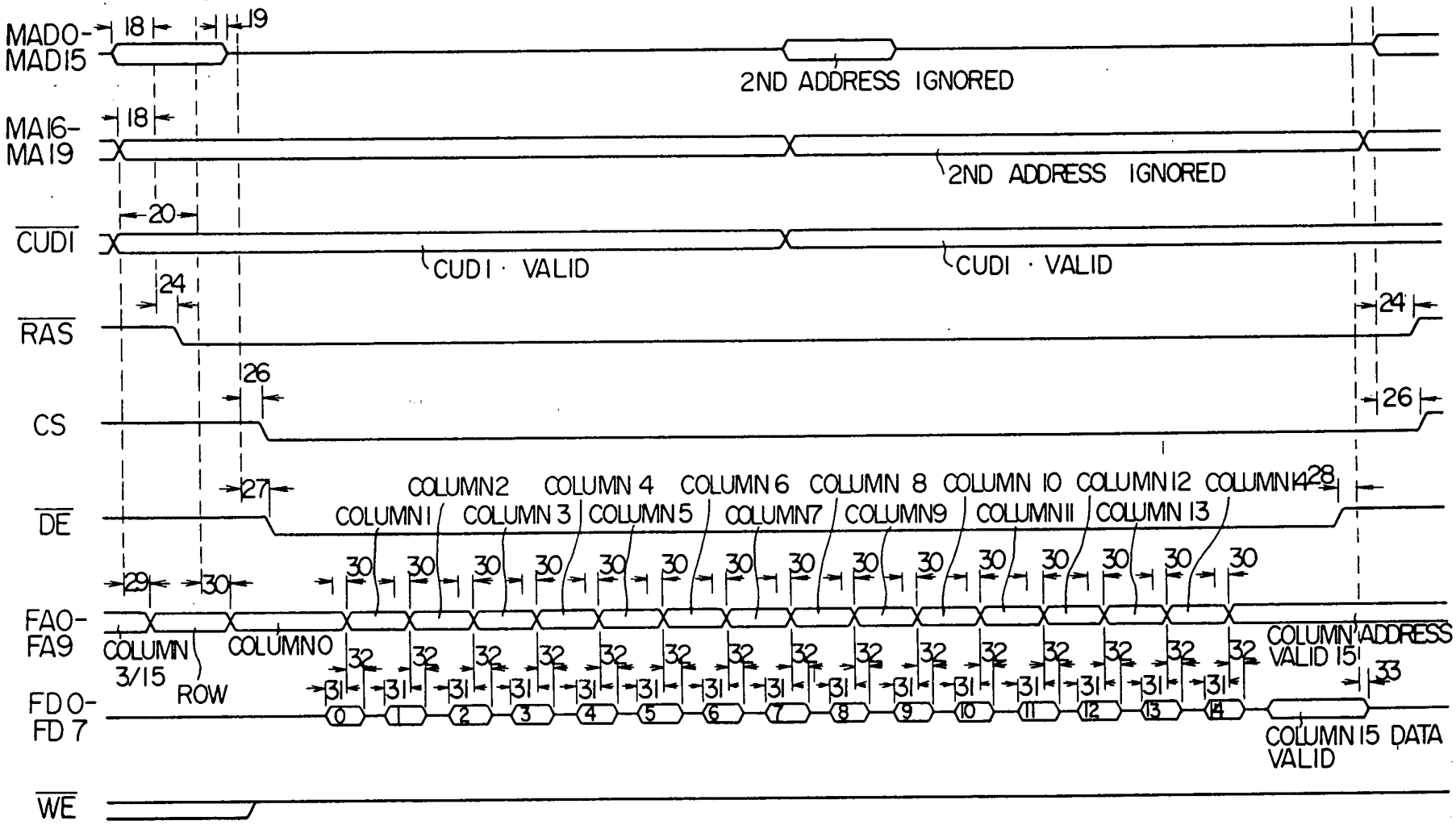

MAD0-MAD15
18
19
2ND ADDRESS IGNORED
MA16-MA19
18
2ND ADDRESS IGNORED
CUDI
20
CUDI · VALID
CUDI · VALID
RAS
24
24
CS
26
26
DE
27
28
COLUMN1
COLUMN2
COLUMN 3
COLUMN 4
COLUMN 5
COLUMN 6
COLUMN7
COLUMN 8
COLUMN9
COLUMN 10
COLUMN11
COLUMN 12
COLUMN 13
COLUMN14
29
30
30
FA0-FA9
COLUMN 3/15
ROW
COLUMN0
32
31
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
COLUMN ADDRESS VALID 15
33
FD0-FD7
COLUMN 15 DATA VALID
WE

FIG. 24a

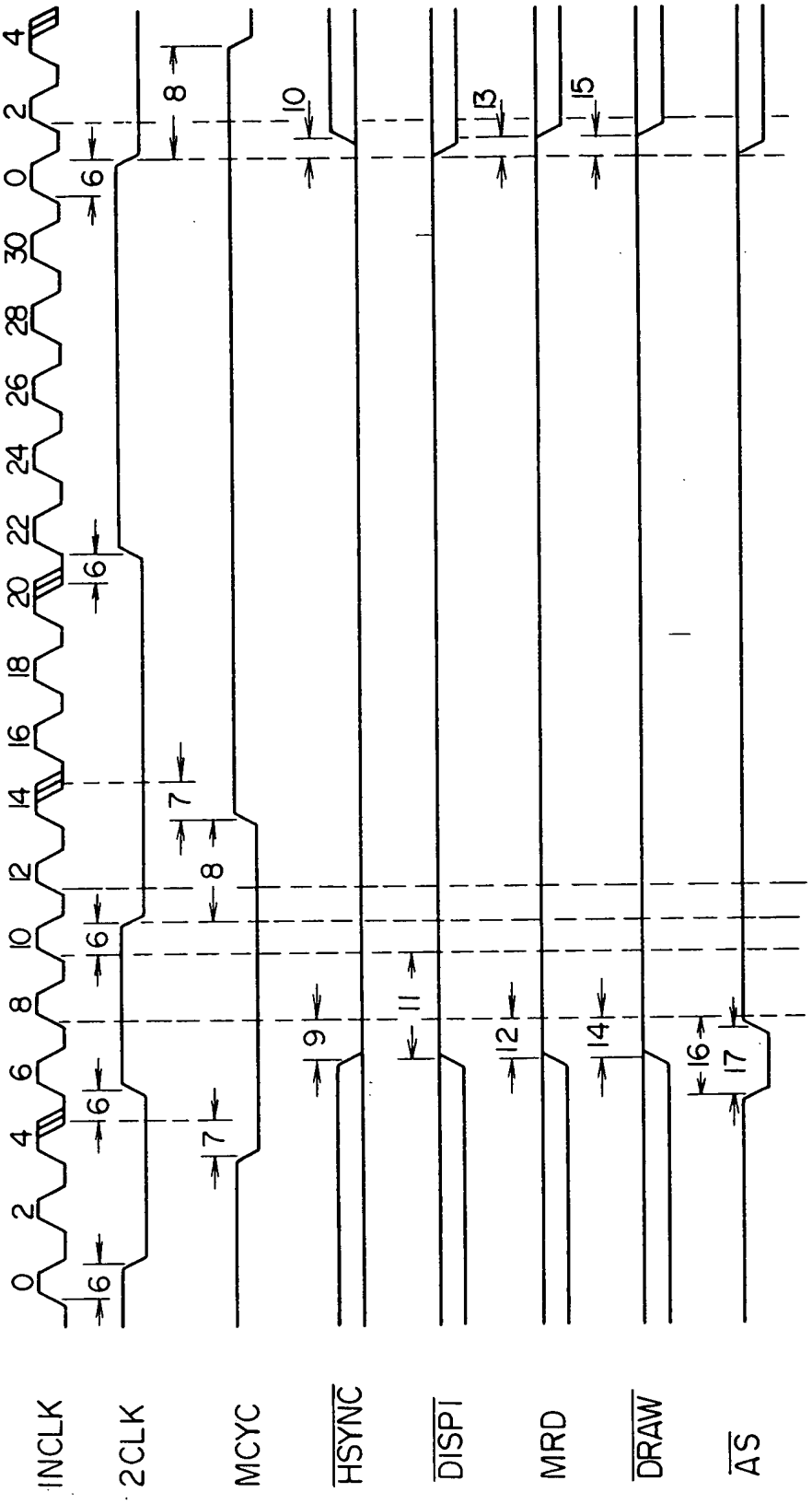

INCLK
2CLK
MCYC
HSYNC
DISPI
MRD
DRAW
AS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
2
4
6
6
6
6
6
7
7
8
8
9
10
11
12
13
14
15
16
17

FIG. 24b

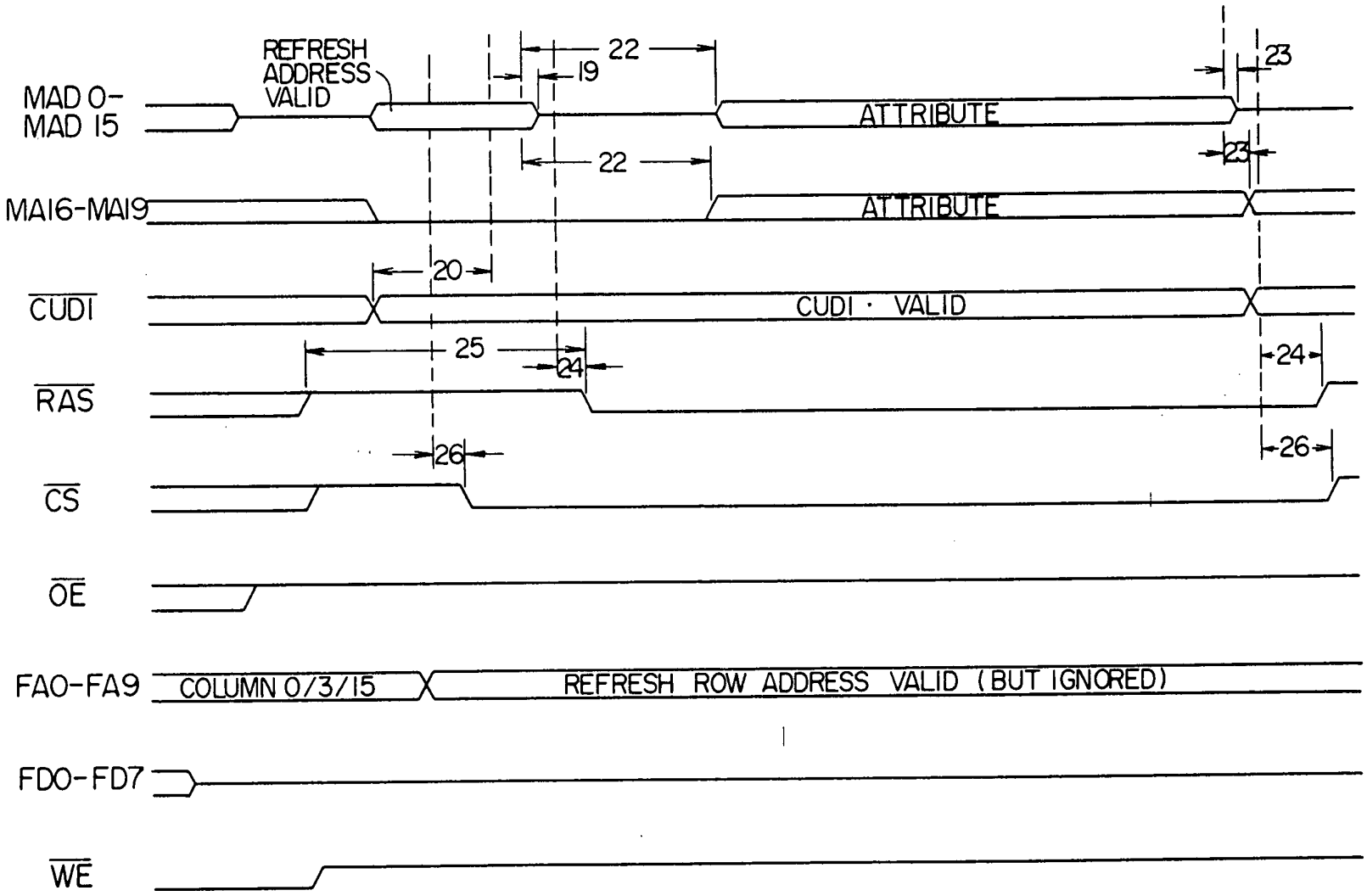

REFRESH ADDRESS VALID
22
19
23
MAD 0-MAD 15
ATTRIBUTE
22
23
MA16-MA19
ATTRIBUTE
20
CUDI
CUDI · VALID
25
24
24
RAS
26
26
CS
OE
FA0-FA9
COLUMN 0/3/15
REFRESH ROW ADDRESS VALID (BUT IGNORED)
FD0-FD7
WE

FIG. 25

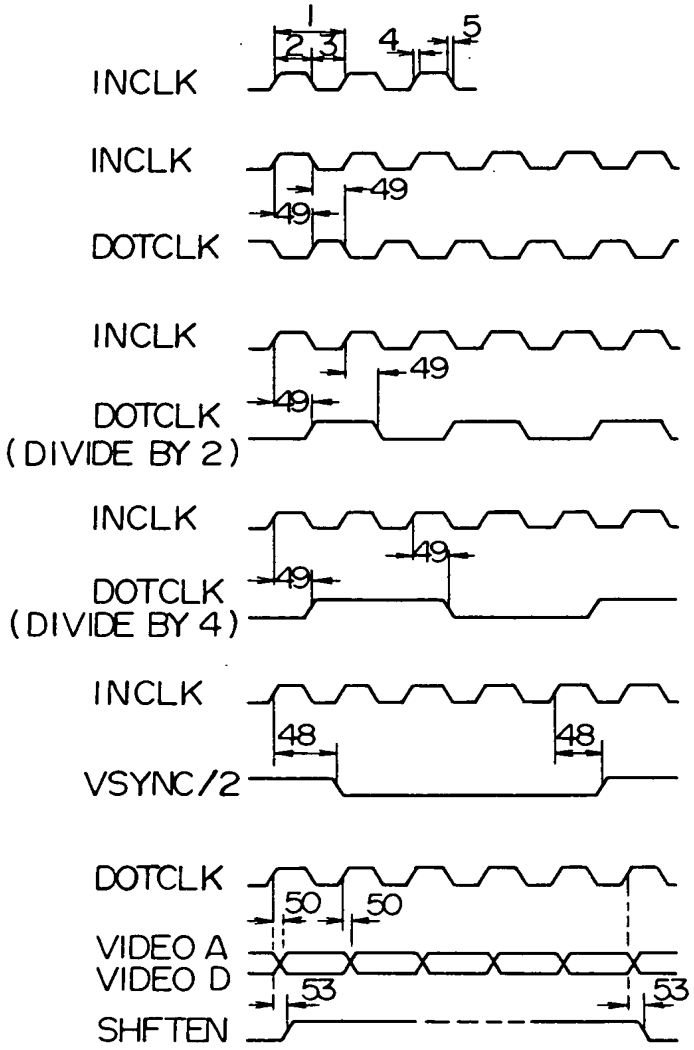

INCLK
1
2
3
4
5
INCLK
DOTCLK
49
49
INCLK
DOTCLK
(DIVIDE BY 2)
49
49
INCLK
DOTCLK
(DIVIDE BY 4)
49
49
INCLK
VSYNC/2
48
48
DOTCLK
VIDEO A
VIDEO D
SHIFTEN
50
50
53
53

FIG. 26

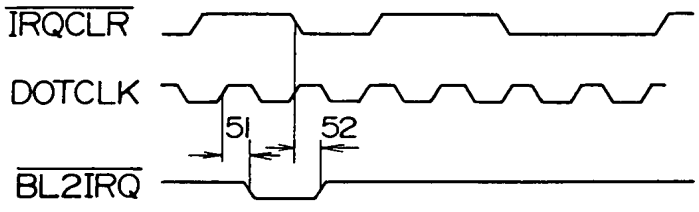

IRQCLR
DOTCLK
BL2IRQ
51
52

FIG. 27

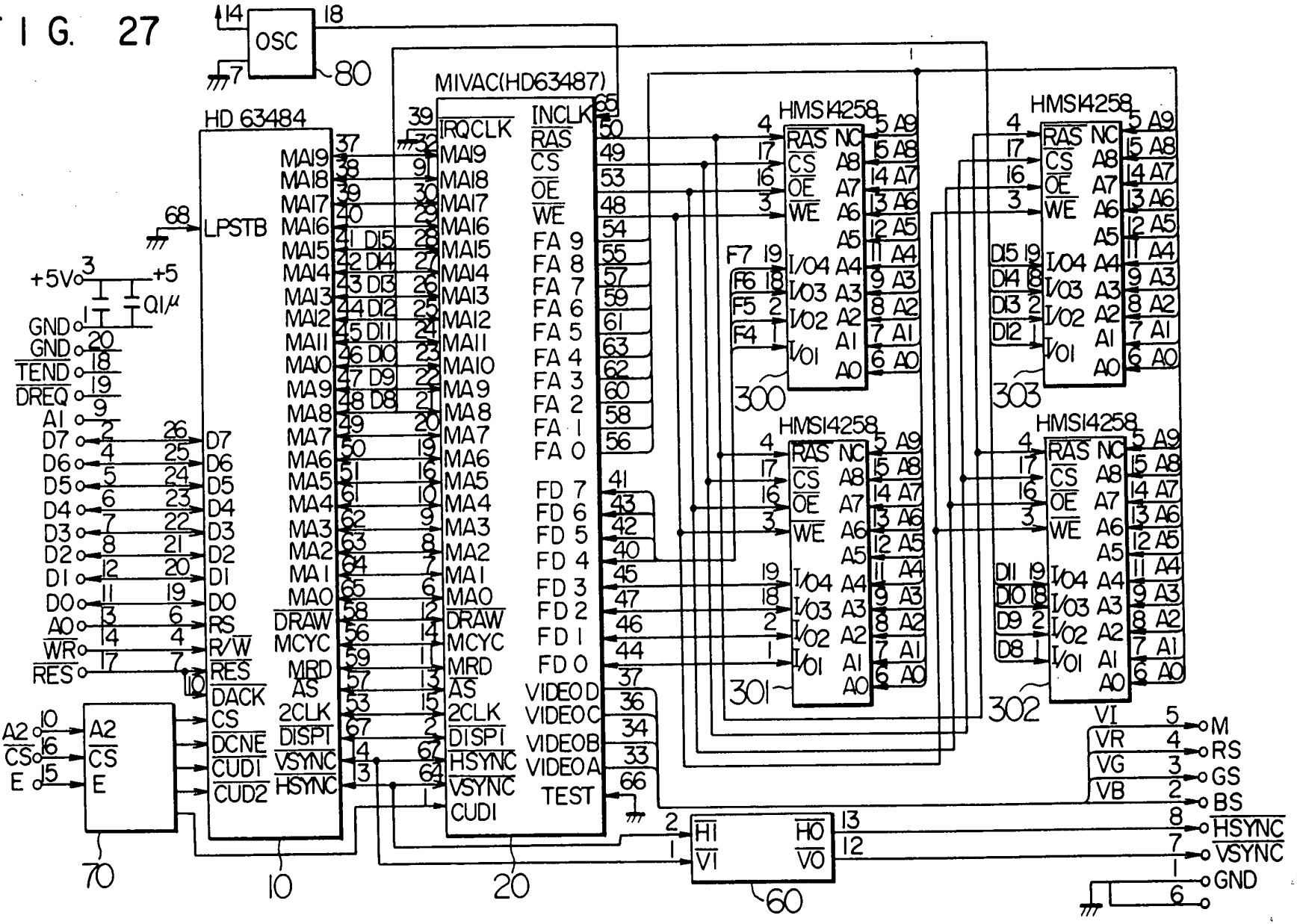

OSC
80
MIVAC(HD63487)
HD 63484
HMS14258
300
301
302
303
LPSTB
+5V
+5
0.1μ
GND
TEND
DREQ
A1
D7
D6
D5
D4
D3
D2
D1
D0
A0
WR
RES
DACK
CS
DCNE
CUD1
CUD2
A2
E
MA19
MA18
MA17
MA16
MA15
MA14
MA13
MA12
MA11
MA10
MA9
MA8
MA7
MA6
MA5
MA4
MA3
MA2
MA1
MA0
DRAW
MCYC
MRD
AS
2CLK
DISP1
VSYNC
HSYNC
IRQCLK
INCLK
RAS
CS
OE
WE
FA 9
FA 8
FA 7
FA 6
FA 5
FA 4
FA 3
FA 2
FA 1
FA 0
FD 7
FD 6
FD 5
FD 4
FD 3
FD 2
FD 1
FD 0
VIDEOD
VIDEOC
VIDEOB
VIDEOA
TEST
HI
VI
HO
VO
VR
VG
VB
M
RS
GS
BS
GND
70
10
20
60

FIG. 28

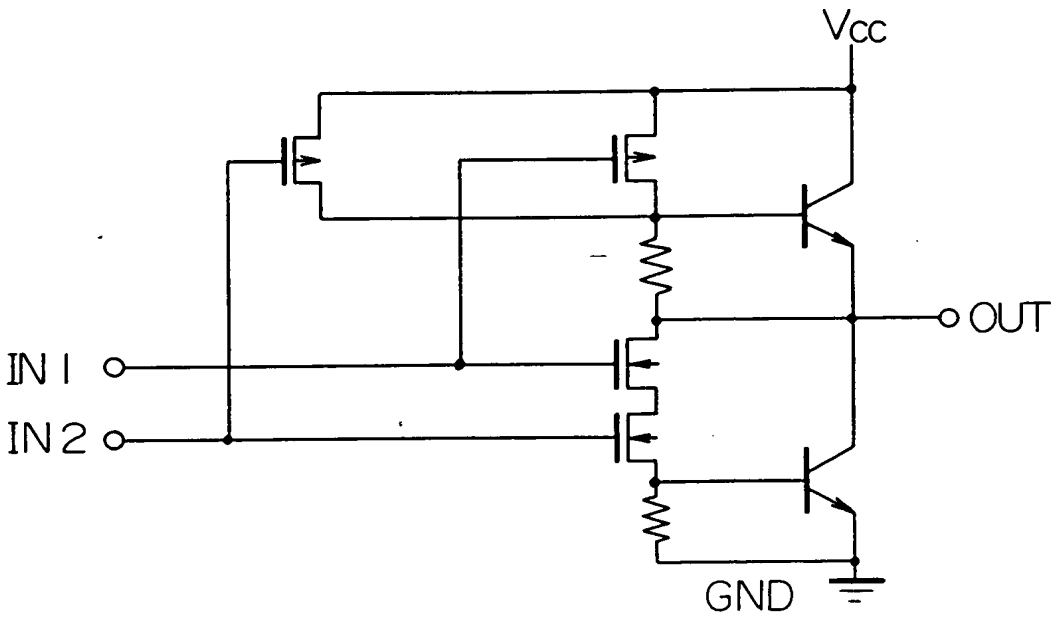


FIG. 29a

FA	4 ACCESSES / MCYC (DRAW, DISPLAY)				16 ACCESSES / 2 MCYCS (DISPLAY)			
	256K x 4-BIT (VMDO = 0)		1M x 4-BIT (VMDO = 1)		256K x 4-BIT (VMDO = 0)		1M x 4-BIT (VMDO = 1)	
	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN
9	—	—	MAD 8	NCO	—	—	MAD 8	NCO
8	MAD 9	NC1	MAD 9	NC1	MAD 9	NC1	MAD 9	NC1
7	MAD 8	NC2	MA 17	MAD 7	MAD 8	NC2	MA 17	MAD 7
6	MAD 7	MAD 6	MA 16	MAD 6	MAD 7	MAD 6	MA 16	MAD 6
5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5
4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4
3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3
2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2
1	MAD 11	MAD 1	MAD 11	MAD 1	MAD 11	WC 1	MAD 11	WC 1
0	MAD 10	MAD 0	MAD 10	MAD 0	MAD 10	WC 0	MAD 10	WC 0

[ ] : COLUMN ADDRESS COUNTER

FIG. 29b

FA	2 ACCESSES / MCYC (DRAW)				4 ACCESSES / MCYC (DISPLAY)				16 ACCESSES / 2MCYCS (DISPLAY)			
	256Kx4-BIT (VMDO=0)		1Mx4-BIT (VMDO=1)		256Kx4-BIT (VMDO=0)		1Mx4-BIT (VMDO=1)		256Kx4-BIT (VMDO=0)		1Mx4-BIT (VMDO=1)	
	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN
9	-	-	MA 18	[NC 0]	-	-	MA 18	[NC 0]	-	-	MA 18	[NC 0]
8	MAD 9	[NC 1]	MAD 9	MAD 8	MAD 9	[NC 1]	MAD 9	MAD 8	MAD 9	[NC 1]	MAD 9	MAD 8
7	MAD 8	MAD 7	MA 17	MAD 7	MAD 8	MAD7	MA 17	MAD 7	MAD 8	MAD 7	MA 17	MAD 7
6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6
5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5
4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 14
3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3
2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	[WC 2]	MAD 12	[WC 2]
1	MAD 11	MAD 1	MAD 11	MAD 1	MAD 11	MAD 1	MAD 11	MAD 1	MAD 11	[WC 1]	MAD 11	[WC 1]
0	MAD 10	MAD 0	MAD 10	MAD 0	MAD 10	[WC 0]	MAD 10	[WC 0]	MAD 10	[WC 0]	MAD 10	[WC 0]

[ ] : COLUMN ADDRESS COUNTER

FIG. 29c

FA	1 ACCESSES / MCYC (DRAW)				4 ACCESSES / MCYC (DISPLAY)			
	256K x 4-BIT (VMDO=0)		1M x 4-BIT (VMDO=1)		256K x 4-BIT (VMDO=0)		1M x 4-BIT (VMDO=1)	
	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN	ROW	COLUMN
9	–	–	MA 18	MAD 9	–	–	MA 18	MAD 9
8	MAD 9	MAD 8	MA 19	MAD 8	MAD 9	MAD 8	MA 19	MAD 8
7	MA 17	MAD 7	MA 17	MAD 7	MA 17	MAD 7	MAD17	MAD 7
6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6	MA 16	MAD 6
5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5	MAD 15	MAD 5
4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4	MAD 14	MAD 4
3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3	MAD 13	MAD 3
2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2	MAD 12	MAD 2
1	MAD 11	MAD 1	MAD 11	MAD 1	MAD 11	WC1	MAD 11	WC1
0	MAD 10	MAD 0	MAD 10	MAD 0	MAD 10	WC0	MAD 10	WC0

[ ]: COLUMN ADDRESS COUNTER